PROJECT MANUAL

INCLUDING CONSTRUCTION SPECIFICATIONS
for

ITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE "C"

at

DESTIN-FORT WALTON BEACH AIRPORT
1701- State Road 85 North
Eglin AFB, Florida 32542-1498

For

OKALOOSA COUNTY, FLORIDA
BOARD OF COUNTY COMMISSIONERS

Issue Date
FEBRUARY, 2021
BID DOCUMENTS

Documents Prepared and Submitted by:

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INVITATION TO BID (ITB) & RESPONDENT'S ACKNOWLEDGEMENT

ITB TITLE: **CONSTRUCTION SATELLITE CONCOURSE "C"– DESTIN—FORT WALTON BEACH AIRPORT (VPS)**

ITB NUMBER: ITB AP 21-21

ISSUE DATE:	February 08, 2021 8:00 AM CST
PRE BID CONFERENCE:	February 17, 2021 11:00 AM CST
LAST DAY FOR QUESTIONS:	February 24, 2021 4:00 PM CST
ITB OPENING DATE & TIME:	**March 10, 2021 3:00 PM CST**

NOTE: BIDS RECEIVED AFTER THE BID OPENING DATE & TIME WILL NOT BE CONSIDERED.

Okaloosa County, Florida solicits your company to submit a bid on the above referenced goods or services. All terms, specifications and conditions set forth in this ITB are incorporated into your response. A bid will not be accepted unless all conditions have been met. All bids must have an authorized signature in the space provided below. All bids must be sealed and received by the Okaloosa County Clerk of Court by the "ITB Opening Date & Time" referenced above. "ITB Number" and the "ITB Opening Date & Time". Okaloosa County is not responsible for lost or late delivery of bids by the U.S. Postal Service or other delivery services used by the respondent. Neither faxed nor electronically submitted bids will be accepted. Bids may not be withdrawn for a period of one hundred and twenty (120) days after the bid opening unless otherwise specified.

RESPONDENT ACKNOWLEDGEMENT FORM BELOW MUST BE COMPLETED, SIGNED, AND RETURNED AS PART OF YOUR BID. BIDS WILL NOT BE ACCEPTED WITHOUT THIS FORM, SIGNED BY AN AUTHORIZED AGENT OF THE RESPONDENT.

COMPANY NAME _____

MAILING ADDRESS _____

_____

CITY, STATE, ZIP _____

FEDERAL EMPLOYER'S IDENTIFICATION NUMBER (FEIN): _____

TELEPHONE NUMBER: _____ EXT: _____ FAX: _____

EMAIL: _____

I CERTIFY THAT THIS BID IS MADE WITHOUT PRIOR UNDERSTANDING, AGREEMENT, OR CONNECTION WITH ANY OTHER RESPONDENT SUBMITTING A BID FOR THE SAME MATERIALS, SUPPLIES, EQUIPMENT OR SERVICES, AND IS IN ALL RESPECTS FAIR AND WITHOUT COLLUSION OR FRAUD. I AGREE TO ABIDE BY ALL TERMS AND CONDITIONS OF THIS BID AND CERTIFY THAT I AM AUTHORIZED TO SIGN THIS BID FOR THE RESPONDENT.

AUTHORIZED SIGNATURE: _____ TYPED OR PRINTED NAME _____

TITLE: _____

_____ DATE _____

Rev: September 22, 2015

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NOTICE TO RESPONDENTS

CONSTRUCTION OF SATELLITE CONCOURSE "C" AT
at
DESTIN-FORT WALTON BEACH AIRPORT (VPS)
OKALOOSA COUNTY, FLORIDA

Notice is hereby given that the Board of County Commissioners of Okaloosa County will receive sealed bids until **March 10, 2021 at 3:00 P.M.** (local time- CST) for the CONSTRUCTION OF SATELLITE CONCOURSE "C" at Destin-Fort Walton Beach Airport project. Interested respondents desiring consideration shall provide an original and two (2) copies (total of three (3)) of their Invitation to Bid (ITB). Submissions shall be portrait oriented, unbound, and 8 ½"x 11" where practical. **All originals must have original signatures in blue ink.**

Beginning on **Monday February 08, 2021** digital copies of the above documents may be downloaded by accessing the following sites:
http://www.myokaloosa.com/purchasing/home then accessing the link "View Current Solicitations"
https://www.bidnetdirect.com/florida
https://www.demandstar.com/supplier/bids/agency_inc/bid_list.asp?f=search&mi=2442519

Okaloosa County, hereby formally known as ("COUNTY"/"OWNER"), on behalf of its Airports Department ("AIRPORT") desires to construct an airport terminal concourse building on the west side of the commercial service Destin-Fort Walton Beach Airport (VPS). The facility is a single-story structure including building envelope, utility connection, TSA checkpoint, passenger hold rooms, restrooms and related infrastructure as designed in the plans.

Funding for this project is being provided by Okaloosa County and will be subject to all applicable County, State and Federal requirements as determined applicable.

A non-mandatory Pre-Bid Conference will be conducted at the Destin-Fort Walton Beach Airport, Conference Room No. 1, 1701 State Road 85 N., Eglin AFB, Florida 32542, on **February 17, 2021 at 11:00 A.M. (CST).** Okaloosa County will transmit to all plan holders of record an Addenda in response to written questions received no later than seven (7) days prior to Bid Opening date. Oral statements may not be relied upon and will not be binding or legally effective.

In addition to the in-person Pre-Bid Conference at the Destin-Fort Walton Beach Airport, the Airport is offering a virtual method of attendance for the conference conducted through a Zoom meeting on **February 17, 2021 at 11:00 A.M. (CST).**

To attend the Zoom meeting, follow the below information to log-in:

Join Zoom Meeting:

https://myokaloosa.zoom.us/j/4587775973?pwd=N1g5aXMxVUhxWDRuNktkczJTM2x4dz09

Meeting ID: 458 777 5973
Password: 548523
One tap mobile: +19712471195,,4587775973#,,1#,548523#
US8887880099,,4587775973#,,1#,548523# US Toll-free
Dial by your location:

+1 971 247 1195 US
888 788 0099 US Toll-free
877 853 5247 US Toll-free

The last day for questions will be **February 24, 2021 at 4:00 P.M. (CST)**.

On **March 10, 2021 at 3:00 P.M.** (**CST**), all bids will be opened and read aloud. All bids must be in sealed envelopes reflecting on the outside thereof the Respondent's name and **"ITB AP 21-21 CONSTRUCT SATELLITE CONCOURSE "C" AT THE DESTIN – FORT WALTON BEACH AIRPORT (VPS)".** The Board of County Commissioners will consider all bids properly submitted at its scheduled bid opening in the Okaloosa County Purchasing Department **located at 5479A Old Bethel Rd., Crestview, FL.** If delivering on the bid opening day, delivery must be in person at 5479A Old Bethel Rd., Crestview, FL.

In order to help protect yourself and others, a face covering or mask will be required to attend the meeting. The Airports and Purchasing Department staff will provide additional instructions to attendees to ensure a safe atmosphere during the Pre-Bid Conference. Staff will be following the latest guidance from the CDC, State, and Local authorities.

The County reserves the right to award the bid to the lowest responsive respondent and to waive any irregularity or technicality in bids received. Okaloosa County shall be the sole judge of the bid and the resulting Agreement that is in its best interest and its decision shall be final.

NOTE: Crestview, FL is not a next day guaranteed delivery location by most delivery services. Respondents using mail or delivery services assume all risks of late or non-delivery.

All originals must have original signatures in blue pen ink.

All bids should be addressed as follows:

BID ENCLOSED – "ITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE "C" AT THE DESTIN – FORT WALTON BEACH AIRPORT (VPS)"
Okaloosa County Purchasing Department
5479A Old Bethel Rd
Crestview FL 32536

Jeffrey A Hyde 02/02/2021
Jeff Hyde Date
Purchasing Manager

BOARD OF COUNTY COMMISSIONERS
OKALOOSA COUNTY, FL
Carolyn N. Ketchel, Chairman

INSTRUCTIONS TO CONTRACTORS

PROJECT IDENTIFICATION:

a) Project Title:

CONSTRUCTION OF SATELLITE CONCOURSE "C" AT VPS

b) Owner:

OKALOOSA COUNTY BOARD OF COUNTY COMMISSIONERS

c) Architect:

MLM-MARTIN ARCHITECTS, INC.

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1. Defined Terms.

Certain additional terms used in the Instruction to Contactors have the meanings indicated below which are applicable to both the singular and plural thereof.

1.1 Contactor – one who submits a Bid directly to Owner as distinct from sub-contractor, who submits a bid to a Contactor.

1.2 Issuing Office/Purchasing Department – the office from which the Project Documents are to be issued and where the bid procedures are to be administered.

1.3 Successful Contactor – the lowest, responsible and responsive Contactor to whom Owner (on the basis of Owner's evaluation as hereinafter provided) makes an award.

2. Copies of Project Documents.

2.1 Complete sets of the Project Documents may be obtained from BidNet, Demand Star and the Okaloosa County website.

2.2 Complete sets of Project Documents must be used in preparing Bids; neither Owner nor Architect/Engineer assume any responsibility for errors or misinterpretations resulting from the use of incomplete sets of Project Documents.

2.3 Owner and Architect/Engineer in making copies of Project Documents available on the above terms do so only for the purpose of obtaining Bids for the Work and do not confer a license or grant for any other use.

3. Qualifications of Contractors.

To demonstrate qualifications to perform the Work, each Contractor must upon Owner's request, provide detailed written evidence such as financial data, previous experience, present commitments and other such data as may be called for below. Each Bid must contain evidence of Contractors qualification to do business in the state where the Project is located or covenant to obtain such qualification prior to award of the contract.

4. Examination of Documents and Site.

4.1 It is the responsibility of each contactor before submitting a Bid:

4.1.1 To examine thoroughly these documents and other related data identified (including "technical data" referred to below);

4.1.2 To visit the site to become familiar with and satisfy Contactor as to the general, local and site conditions that may affect cost, progress, performance, or furnishing of the Work;

4.1.3 To consider federal, state, and local Laws and Regulations that may affect cost, progress, performance or furnishing of the Work;

4.1.4 To study and carefully correlate Contactor's knowledge and observations with these Project Documents and such other related data; and

4.1.5 To promptly notify Architect/Engineer of all conflicts, errors, ambiguities or discrepancies which Contactor has discovered in or between these Project Documents and such other related documents.

4.2 thru 4.5 (Omitted-Supplementary Conditions Not Applicable)

4.6 Upon request to the Purchasing Department, Owner will provide each Contactor access to the site to conduct such examinations, investigations, explorations, tests, and studies as each Contactor deems necessary for submission of a Bid. Contactor must fill all holes and clean up and restore the site to its former conditions upon completion of such explorations, investigations, tests, and studies.

4.7 Reference is made to the Bid documents for the identification of the general nature of work that is to be performed at the site by Owner or others (such as utilities and other prime contractors) that relates to the work for which a Bid is to be submitted. On request to the Purchasing Department, Owner will provide to each Contactor for examination access to or copies of appropriate documents (other than portions thereof related to price) for such work.

4.8 The submission of a Bid will constitute and incontrovertible representation by Contactor that Contactor has complied with every requirement of this Article 4, that without exception of the Bid is premised upon performing and furnishing the Work required by these Project Documents and applying the specific means, methods, techniques, sequences, or procedures for construction (if any) that may be shown or indicated or expressly required by these Project Documents, the Contactor has given Architect/Engineer written notice of all conflicts, errors, ambiguities and discrepancies that Contactor has discovered in these Project Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work.

4.9 The provisions of 4.1 through 4.8, inclusive, do not apply to Asbestos, Polychlorinated biphenyls (PCBs), Petroleum, Hazardous Waste, or Radioactive Material by paragraph 4.5 of the General Conditions.

5. Availability of Lands for Work, Etc.

The lands upon which the Work is to be performed, rights-of-way and easements for access thereto and other lands designated for use by the successful Contactor in performing the Work are identified in these Project Documents. All additional land and access thereto required for temporary construction facilities, construction equipment, or storage of materials and equipment to be incorporated in the Work are to be obtained and paid for by the Successful Contactor. Easements for permanent structures or permanent changes in existing facilities are to be obtained and paid for by Owner unless otherwise provided in these Project Documents.

6. Interpretations and Addenda.

6.1 All questions about the meaning or intent of these Project Documents are to be directed to Issuing Office. Interpretations or clarifications considered necessary by Issuing Office in

response to such questions will be issued by Addenda on the Purchasing website, Bid Net and Demand Star as mentioned above. Questions received after the question deadline may not be answered. Only questions answered by formal written Addenda will be binding. Oral and other interpretations or clarifications will be without legal effect.

Addenda may also be issued to modify these Project Documents as deemed advisable by Owner or Architect/Engineer.

7. Bid Security.

7.1 Each Bid must be accompanied by Bid security made payable to Owner in an amount of five percent (5%) of Contactors maximum Bid Price in the form of a certified or bank check or a Bid Bond on form attached, issued by a surety meeting the requirements of Paragraph 5.1 of the General Conditions.

7.2 The Bid security of Successful Contactor will be retained until such Contactor has executed the Agreement, furnished the required contract security, and met the other conditions of the Notice of Award, whereupon the Bid security will be returned. If the Successful Contactor fails to execute and deliver the Agreement and furnishes the required contract security within fifteen days after the Notice of Award, Owner may annul the Notice of Award and the Bid security of that Contactor will be forfeited. The Bid security of other Contactors whom Owner believes to have a reasonable chance of receiving the award may be retained by Owner until the earlier of:

the seventh (7th) day after the Effective Date of the Agreement

or

the one-hundred twentieth (120th) day after the Bid opening,

whereupon Bid security furnished by such Contractors will be returned. Bid security with Bids which are not competitive will be returned within seven (7) days after the Bid Opening.

8. Contract Times.

The Contract Time in calendar days, from the Issuance of the Notice to Proceed to Final Project Completion is defined in Section 5 of BID FORMS (BF-2).

9. Substitute and "Or-Equal" Items.

The Contract, if awarded, will be on the basis of materials and equipment described in the Drawings or specified in the Specifications. Whenever it is indicated in the Drawings or specified in the Specifications that a substitute or “or-equal” item of material or equipment may be furnished or used by Contractor if acceptable to the County, acceptance of the substitution “or equal” to material or equipment, will typically be considered by the County after the contract is awarded. However, any proposed substitution that represents a deviation from the design intent, must be approved prior to submission of the bid responses. A determination as to whether a design deviation or particular item that changes the design intent of the plans or specification is acceptable as a substitute or “equal” will be made by the County and Architect/Engineer. Design

deviations approved prior to bid submittals will be made known to other contactors through an addendum.

10. Subcontractors, Suppliers, and Others.

10.1 If the Bid documents require the identity of certain Subcontractors, Suppliers and other persons and organizations (including those who are to furnished the principal items of material and equipment) are to be submitted to Owner in advance of a specified date prior to the Effective Date of the Agreement. Apparent Successful Contractor, and any other Contractor so requested, shall with Bid documents submit to Owner a list of all such Subcontractors, Suppliers, and other persons and organizations proposed for those portions of the Work for which such identification is required. Such list shall be accompanied by an experience statement with pertinent information regarding similar projects and other evidence of qualification for each such Subcontractor Supplier, person, or organization if requested by Owner. An Owner or Architect/Engineer who after due investigation has reasonable objection to any proposed Subcontractor, Supplier, other person, or organization, may before the Notice of Award is given request apparent Successful Contractor to submit an acceptable substitute without an increase in Bid Price.

If apparent Successful Contractor declines to make any such substitution, Owner may award the contract to the next lowest Contractor that proposes to use acceptable Subcontractors, Suppliers, and other persons and organizations. The declining to make requested substitutions will not constitute grounds for sacrificing the Bid security of any Contractor. Any subcontractor, Supplier, other person or organization listed and to whom Owner or Architect/Engineer does not make written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner and Architect/Engineer subject to revocation of such acceptance after the Effective Date of the Agreement as provided in Paragraph 6.8.2 of the General Conditions.

11. Pre-Bid Activity.

Except as provided in this section, contactors are prohibited from contacting or lobbying the County, County Administrator, Commissioners, County staff, and Review Committee members, or any other person authorized on behalf of the County related or involved with the solicitation. All inquiries on the scope of work, specifications, additional requirements, attachments, terms and general conditions or instructions, or any issue must be directed in writing, by US mail or email to:

Okaloosa County Purchasing Department
5479A Old Bethel Road
Crestview, FL 32536
Email: jdarr@myokaloosa.com
(850) 689-5960

All questions or inquiries must be received no later than the last day for questions (reference ITB & Contactor's Acknowledgement form). Any addenda or other modification to the bid documents will be issued by the County five (5) days prior to the date and time of bid closing, as written addenda, and will be posted to and the Okaloosa County website at http://www.myokaloosa.com/purchasing/current-solicitations, the Bidnet website at https://www.bidnetdirect.com/florida and Demand Star at https://www.demandstar.com/supplier/bids/agency_inc/bid_list.asp?f=search&mi=2442519

Such written addenda or modification shall be part of the bid documents and shall be binding upon each contactor. Each contactor is required to acknowledge receipt of any and all addenda in writing and submit with their bid. No contactor may rely upon any verbal modification or interpretation.

12. Preparation of Bid – The bid form is included with the bid documents. Additional copies may be obtained from the County. The contactor shall submit bids in accordance with the public notice.

All blanks in the bid documents shall be completed by printing in ink or typed in both words and numbers with the amounts extended, totaled and the bid signed. A bid price shall be indicated for each section, bid item, alternative, adjustment unit price item, and unit price item listed therein, or the words "No Bid", "No Change", or "Not Applicable" entered. No changes shall be made to the phraseology of the form or in the items mentioned therein. In case of any discrepancy between the written amount and the numerical figures, the written amount shall govern. Any bid which contains any omissions, erasures, alterations, additions, irregularities of any kind, or items not called for which shall in any manner fail to conform to the conditions of public notice inviting bids may be rejected.

A bid submitted by a partnership shall be executed in the partnership name and signed by a partner (whose title must appear under the signature). The official address of the partnership shall be shown below the signature.

A bid submitted by a limited liability company shall be executed in the name of the firm by a member and accompanied by evidence of authority to sign. The state of formation of the firm and the official address of the firm must be shown below the signature.

A bid submitted by an individual shall show the contactor's name and official address.

A bid submitted by a joint venture shall be executed by each joint venture in the manner indicated on the bid form. The official address of the joint venture must be shown below the signature.
It is preferred that all signatures be in <u>blue ink</u> with the names type or printed below the signature. Okaloosa County does not accept electronic signatures.

The bid shall contain an acknowledgement of receipt of all Addenda, the numbers of which shall be filled in on the form. The address and telephone # for communications regarding the bid shall be shown.

If the contactor is an out-of-state corporation, the bid shall contain evidence of contactor's authority and qualification to do business as an out-of-state corporation in the State of Florida. A state contractor license # for the State of Florida shall also be included on the bid form. Contactor shall be licensed in accordance with the requirements of Chapter 489, Florida Statutes.

13. Integrity of Bid Documents – Contactors shall use the original Bid documents provided by the Purchasing Department and enter information only in the spaces where a response is requested. Contactors may use an attachment as an addendum to the Bid documents if sufficient space is not available. Any modifications or alterations to the original bid documents by the

contactor, whether intentional or otherwise, will constitute grounds for rejection of a bid. Any such modification or alteration that a contactor wish to propose must be clearly stated in the contactor's response in the form of an addendum to the original bid documents.

14. Submittal of Bid – A bid shall be submitted no later than the date and time prescribed and at the place indicated in the advertisement or invitation to bid and shall be enclosed in an opaque sealed envelope plainly marked with the project title (and, if applicable, the designated portion of the project for which the bid is submitted), the name and address of the contactor, and shall be accompanied by the bid security and other required documents. It is the contactor's responsibility to assure that its bid is delivered at the proper time and place. Offers by email, facsimile, or telephone will **NOT** be accepted.

Contractor shall submit the original bid and two (2) copies (total of three (3)) of their Invitation to Bid (ITB)) indicated in the Advertisement of Notice to Contactor.

Note: Crestview is <u>not</u> a next day delivery site for overnight carriers.

15. Modification & Withdrawal of Bid – A bid may be modified or withdrawn by an appropriate document duly executed in the manner that a bid must be executed and delivered to the place where bids are to be submitted prior to the date and time for the opening of bids.

If within 24 hours after bids are opened any contactor files a duly signed written notice with the County and promptly thereafter demonstrates to the reasonable satisfaction of the County that there was a material substantial mistake in the preparation of its bid, that contactor may withdraw its bid, and the bid security may be returned. Thereafter, if the work is rebid, that contactor will be disqualified from 1) further bidding on the work, and 2) doing any work on the contract, either as a subcontractor or in any other capacity.

16. Bids to Remain Subject to Acceptance – All bids will remain subject to acceptance or rejection for one hundred twenty (120) calendar days after the day of the bid opening, but the County may, in its sole discretion, release any bid and return the bid security prior to the end of this period.

17. Identical Tie Bids – In cases of identical procurement responses, the award shall be determined either by lot or on the basis of factors deemed to serve the best interest of the County. In the case of the latter, there must be adequate documentation to support such a decision.

18. Conditional & Incomplete Bids – Okaloosa County specifically reserves the right to reject any conditional bid and bids which make it impossible to determine the true amount of the bid.

19. Applicable Laws & Regulations – All applicable Federal and State laws, County and municipal ordinances, orders, rules and regulations of all authorities having jurisdiction over the project shall apply to the bid throughout, and they will be deemed to be included in the contract the same as though they were written in full therein.

20. Disqualification of Contactors – Any of the following reasons may be considered as sufficient for the disqualification of a contactor and the rejection of its bid:

a. Submission of more than one proposal for the same work from an individual, firm or corporation under the same or different name.

b. Evidence that the contactor has a financial interest in the firm of another contactor for the same work.

c. Evidence of collusion among contactors. Participants in such collusion will receive no recognition as contactors for any future work of the County until such participant has been reinstated as a qualified contactor.

d. Uncompleted work which in the judgment of the County might hinder or prevent the prompt completion of additional work if awarded.

e. Failure to pay or satisfactorily settle all bills due for labor and material on former contracts in force at the time of advertisement of proposals.

f. Default under previous contract.

g. Listing of the contactor by any Local, State or Federal Government on its barred/suspended vendor list.

h. Violation of the Cone of Silence.

21. Award of Bid

a. **Okaloosa County Review** – Okaloosa County Designated Staff, to include design consultant, will review all bids and will participate in the Recommendation to Award.

b. The County will award the bid to the responsive and responsible vendor(s) with the lowest responsive bid(s), Base Bid plus any combination of Additive Alternates, and the County reserves the right to award the bid to the contactor submitting a responsive bid with a resulting negotiated agreement which is most advantageous and in the best interest of the County, and to reject any and all bids or to waive any irregularity or technicality in bids received. Okaloosa County shall be the sole judge of the bid and the resulting negotiated agreement that is in its best interest and its decision shall be final.

c. Okaloosa County reserves the right to waive any informalities or reject any and all bids, in whole or part, to utilize any applicable state contracts in lieu of or in addition to this bid and to accept the bid that in its judgment will best serve the interest of the County.

d. Okaloosa County specifically reserves the right to reject any conditional bids and will normally reject those which made it impossible to determine the true amount of the bid. Each item must be bid separately and no attempt is to be made to tie any item or items to any other item or items.

22. Payments – The respondent shall be paid upon submission of invoices and approval of acceptance by Okaloosa County Board of County Commissioners, Finance Office, 302 N. Wilson St., #203, Crestview FL 32536, for the prices stipulated herein for contract deliverables delivered,

completed and accepted minus retainage as specified in the contract. Invoices must show the Contract number.

23. Discrimination – An entity or affiliate who has been placed on the discriminatory vendor list may not submit a bid on a contract to provide goods or services to a public entity, may not submit a bid on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids on leases of real property to a public entity, may not award or perform work as a contractor, supplier, subcontractor, or consultant under contract with any public entity, and may not transact business with any public entity.

24. Public Entity Crime Information – Pursuant to Florida Statute 287.133, a contactor may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity; and may not transact business with any public entity in excess of the threshold amount provided in s. 287.017 for CATEGORY TWO for a period of 36 months following the date of being placed on the convicted vendor list.

25. Conflict of Interest – The award hereunder is subject to the provisions of Chapter 112, Florida Statutes. All contactors must disclose with their bids the name of any officer, director, or agent who is also a public officer or an employee of the Okaloosa Board of County Commissioners, or any of its agencies. Furthermore, all contactors must disclose the name of any County officer or employee who owns, directly or indirectly, an interest of five percent (5%) or more in the firm or any of its branches.

Note: For contactor's convenience, this certification form is enclosed and is made a part of the bid package.

26. Reorganization or Bankruptcy Proceedings – Bids will not be considered from contactors who are currently involved in official financial reorganization or bankruptcy proceedings.

27. Investigation of Contactor – The County may make such investigations, as it deems necessary to determine the stability of the contactor to perform the work and that there is no conflict of interest as it relates to the project. The contactor shall furnish to the Owner any additional information and financial data for this purpose as the County may request.

28. Cone of Silence Clause – The Okaloosa County Board of County Commissioners has established a solicitation silence policy **(Cone of Silence Clause)** that prohibits oral and written communication regarding all formal solicitations for goods and services (formal bids, Request for Proposals, Requests for Qualifications) issued by the Board through the County Purchasing Department. The period commences from the date of advertisement until award of contract.

All communications shall be directed to the Purchasing Department.

Note: For contactor's convenience, this certification form is enclosed and is made a part of the bid package.

29. Review of Procurement Documents – Per Florida Statute 119.071(1)(b) 2 sealed bids, proposals, or replies received by the County pursuant to a competitive solicitation are exempt

from public disclosure until such time as the County provides notice of an intended decision or until 30 days after opening the bids, proposals, or final replies, whichever is earlier.

30. Compliance with Florida Statute 119.0701 – The Contactor shall comply with all the provisions of section 119.0701, Florida Statutes relating to the public records which requires, among other things, that the Contactor: (a) Keep and maintain public records; (b) Provide the public with access to public records on the same terms and conditions that the public agency would provide the records; (c) ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law; and (d) Meet all requirements for retaining public records and transfer, at no cost, to the public agency all public records in possession of the contactor upon termination of the contract.

31. Protection of Resident Workers – The Okaloosa County Board of County Commissioners actively supports the Immigration and Nationality Act (INA) which includes provisions addressing employment eligibility, employment verifications, and nondiscrimination. Under the (INA), which employers may hire only persons who may legally work in the United States (i.e., citizens and nationals of the U.S.) and aliens authorized to work in the U.S. The employer must verify the identity and employment eligibility of anyone to be hired, which includes completing the Employment Eligibility Verifications. The contactor shall establish appropriate procedures and controls so no services or products under the Contract Documents will be performed or manufactured by any worker who is not legally eligible to perform such services or employment. Okaloosa County reserves the right to request documentation showing compliance with the requirements.

Contractors doing construction business with Okaloosa County are required to use the Federal Government Department of Homeland Security's website and use the E-Verify Employment Eligibility Verifications System to confirm eligibility of all employees to work in the United States.

32. Suspension or Termination for Convenience – The County may, at any time, without cause, order Contactor in writing to suspend, delay or interrupt the work in whole or in part for such period of time as the County may determine, or to terminate all or a portion of the Contract for the County's convenience. Upon such termination, the Contract Price earned to the date of termination shall be paid to Contactor, but Contactor waives any claim for damages, including loss of profits arising out of or related to the early termination. Those Contract provisions which by their nature survive final acceptance shall remain in full force and effect. If the County orders a suspension, the Contract price and Contract time may be adjusted for increases in the cost and time caused by suspension, delay or interruption. No adjustment shall be made to the extent that performance is, was or would have been so suspended, delayed or interrupted by reason for which Contactor is responsible; or that an equitable adjustment is made or denied under another provision of this Contract.

33. Failure of Performance/Delivery - In case of default by the contactor, the County after due notice (oral or written) may procure the necessary supplies or services from other sources and hold the contactor responsible for difference in cost incurred. Continuous instances of default shall result in cancellation of the award and removal of the contactor from the bid list for duration of one (1) year, at the option of the County.

34. Audit - If requested, contactor shall permit the County or an authorized, independent audit agency to inspect all data and records of contactor relating to its performance and its subcontracts under this bid from the date of the award through three (3) years after the expiration of contract.

35. Equal Employment Opportunity; Non Discrimination – Contactor will not discriminate against any employee or an applicant for employment because of race, color, religion, gender, sexual orientation, national origin, age, familial status or handicap.

36. Non-Collusion – Contact or certifies that it has entered into no agreement to commit a fraudulent, deceitful, unlawful or wrongful act, or any act which may result in an unfair advantage over other contactors. See Florida Statute 838.22.

37. Unauthorized Aliens/Patriot's Act – The knowing employment by contactor or its subcontractors of any alien not authorized to work by the immigration laws is prohibited and shall be a default of the contract. In the event that the contactor is notified or becomes aware of such default, the contactor shall take steps as are necessary to terminate said employment with 24 hours of notification or actual knowledge that an alien is being employed. Contactor's failure to take such steps as are necessary to terminate the employment of any said alien within 24 hours of notification or actual knowledge that an alien is being employed shall be grounds for immediate termination of the contract. Contactor shall take all commercially reasonable precautions to ensure that it and its subcontractors do not employ persons who are not authorized to work by the immigration laws.

38. Acceptance – Delivery of material to Okaloosa Board of County Commissioners does not constitute acceptance for the purpose of payment. Final acceptance and authorization of payment shall be given only after a thorough inspection indicates that the material meets contract specifications and conditions as listed. Should the delivered material differ in any respect from specifications, payment will be withheld until such time as the supplier takes necessary corrective action. The Purchasing Department shall be notified of the deviation in writing within 10 days and the provisions of the delivery paragraph shall prevail. If the proposed corrective action is not acceptable to Okaloosa County, the final acceptance of the material shall remain the property of the supplier and the county shall not be liable for payment for any portion thereof.

39. Pre-Bid Conference.

A non-mandatory Pre-Bid Conference will be conducted at the time and place stated in the Notice to Contactors. The County's Purchasing Department, will transmit via the County website and BidNet such Addenda as Architect/Engineer and Owner consider necessary in response to written questions received no later than the question deadline specified in the Invitation to Bid. Oral statements may not be relied upon and will not be binding or legally effective.

40. Sales and Use Taxes.

Work under this Bid is subject to the provisions of Chapter 212, Florida Statutes, Tax on state, Use and Other Transactions. Other state, local, or federal taxes may be applicable. The contractor is responsible to remit to the appropriate governmental entity all applicable taxes. Any applicable tax shall be included in the total Bid price by the contractor.

41. Force Majeure.

Neither party shall be liable, or deemed to be in default, to the other for any failure or delay in performing an obligation under this Agreement to the extent that its performance is delayed, impaired or rendered impossible by an event beyond its control ("Force Majeure Event") such as natural disasters, biological pandemic episodes, war, terrorist acts, riots, labor strikes, civil disturbances, extra-ordinary losses of utilities (including telecommunications services), computer "hacker" attacks on internet infrastructure, regulatory restrictions change in law or regulation or other acts of government authority, including civil and military authorities and courts, fuel or energy shortages, transportation stoppages or slowdowns, the inability to procure parts or raw materials, and/or acts or omissions of common carrier.

END OF INSTRUCTION TO CONTRACTORS

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OKALOOSA COUNTY STANDARD CLAUSES

INDEMNIFICATION AND HOLD HARMLESS

CONTRACTOR shall indemnify and hold harmless **COUNTY**, its officers and employees from liabilities, damages, losses, and costs including but not limited to reasonable attorney fees, to the extent caused by the negligence, recklessness, or intentional wrongful conduct of the **CONTRACTOR** and other persons employed or utilized by the **CONTRACTOR** in the performance of this Agreement.

NOTE: For Contractor's convenience, this certification form is enclosed and is made a part of the bid package.

TRENCH SAFETY ACT

Each contractor must submit with his bid an executed sworn certification that he will comply with the Trench Safety Act, Chapter 90-96, Florida Statues, on trench safety.

NOTE: For Contractor's convenience, a certification form is enclosed and is made a part of the bid package.

PUBLIC ENTITY CRIME INFORMATION

A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid on a contract to provide any goods or services to a public entity, may not submit a bid on a contract with a public entity for the construction or repair of a public building or public work, may not submit bids on leases of real property to a public entity, may not be awarded or perform work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity, and may not transact business with any public entity in excess of the threshold amount provided in Section 287.107, for CATEGORY TWO for a period of 36 months from the date of being placed on the convicted vendor list.

BONDING REQUIREMENTS

A Bid Bond is required with the Contactor's submittal for 5% of the Bid price, in the form of a cashier's check, certified check or bond. A performance and payment bond will be required in the amount of 100% of the estimated contract value. The performance bond and payment bond can be a total of 100% combined.

GENERAL SERVICES INSURANCE REQUIREMENTS

REVISED: 08/01/2018

CONTRACTORS INSURANCE

1. The Contractor shall not commence any work in connection with this Agreement until he has obtained all required insurance and such insurance has been approved by the Okaloosa County Risk Manager or designee.

2. All insurance policies shall be with insurers authorized to do business in the State of Florida.

3. All insurance shall include the interest of all entities named and their respective officials, employees & volunteers of each and all other interests as may be reasonably required by Okaloosa County. The coverage afforded the Additional Insured under this policy shall be primary insurance. If the Additional Insured have other insurance that is applicable to the loss, such other insurance shall be on an excess or contingent basis. The amount of the company's liability under this policy shall not be reduced by the existence of such other insurance.

4. The County shall be shown as an Additional Insured with a Waiver of Subrogation on the Certificate of Insurance.

5. The County shall retain the right to reject all insurance policies that do not meet the requirement of this Agreement. Further, the County reserves the right to change these insurance requirements with 60-day notice to the Contractor.

6. The County reserves the right at any time to require the Contractor to provide copies (redacted if necessary) of any insurance policies to document the insurance coverage specified in this Agreement.

7. The designation of Contractor shall include any associated or subsidiary company which is involved and is a part of the contract and such, if any associated or subsidiary company involved in the project must be named in the Workers' Compensation coverage.

8. Any exclusions or provisions in the insurance maintained by the Contractor that excludes coverage for work contemplated in this agreement shall be deemed unacceptable and shall be considered breach of contract.

WORKERS' COMPENSATION INSURANCE

1. The Contractor shall secure and maintain during the life of this Agreement Workers' Compensation insurance for all of his employees employed for the project or any site connected with the work, including supervision, administration or management, of this project and in case any work is sublet, with the approval of the County, the Contractor shall require the Subcontractor similarly to provide Workers' Compensation insurance for all employees employed at the site of the project, and such evidence of insurance shall be furnished to the County not less than ten (10) days prior to the commencement of any and all sub-contractual Agreements which have been approved by the County.

2. Contractor must be in compliance with all applicable State and Federal workers' compensation laws, including the U.S. Longshore Harbor Workers' Act or Jones Act, if applicable.

3. No class of employee, including the Contractor himself, shall be excluded from the Workers' Compensation insurance coverage. The Workers' Compensation insurance shall also include Employer's Liability coverage.

BUSINESS AUTOMOBILE LIABILITY

Coverage must be afforded for all Owned, Hired, Scheduled, and Non-Owned vehicles for Bodily Injury and Property Damage in an amount not less than $15,000,000 combined single limit each accident. If the contractor does not own vehicles, the contractor shall maintain coverage for Hired & Non-Owned Auto Liability, which may be satisfied by way of endorsement to the Commercial General Liability policy or separate Business Auto Policy. Contractor must maintain this insurance coverage throughout the life of this Agreement.

COMMERCIAL GENERAL LIABILITY INSURANCE

1. The Contractor shall carry other Commercial General Liability insurance against all other Bodily Injury, Property Damage and Personal and Advertising Injury exposures.

2. All liability insurance (other than Professional Liability) shall be written on an occurrence basis and shall not be written on a claims-made basis. If the insurance is issued with an aggregate limit of liability, the aggregate limit of liability shall apply only to the locations included in this Agreement. If, as the result of any claims or other reasons, the available limits of insurance reduce to less than those stated in the Limits of Liability, the Contractor shall notify the County representative in writing. The Contractor shall purchase additional liability insurance to maintain the requirements established in this Agreement. Umbrella or Excess Liability insurance can be purchased to meet the Limits of Liability specified in this Agreement.

3. Commercial General Liability coverage shall include the following:

1.) Premises & Operations Liability
2.) Bodily Injury and Property Damage Liability
3.) Independent Contractors Liability
4.) Contractual Liability
5.) Products and Completed Operations Liability

4. Contractor shall agree to keep in continuous force Commercial General Liability coverage for the length of the contract.

LIMITS OF LIABILITY

The insurance required shall be written for not less than the following, or greater if required by law and shall include Employer's liability with limits as prescribed in this contract:

		LIMIT
1.	Worker's Compensation	
1.)	State	Statutory
2.)	Employer's Liability	$500,000 each accident
2.	Business Automobile (A combined single limit)	$1,000,000.00 each accident
3.	Commercial General Liability	$5,000,000.00 each occurrence

for Bodily Injury & Property Damage $5,000,000.00 each occurrence Products and completed operations

4.	Personal and Advertising Injury	$1,000,000.00 each occurrence

NOTICE OF CLAIMS OR LITIGATION

The Contractor agrees to report any incident or claim that results from performance of this Agreement. The County representative shall receive written notice in the form of a detailed written report describing the incident or claim within ten (10) days of the Contractor's knowledge. In the event such incident or claim involves injury and/or property damage to a third party, verbal notification shall be given the same day the Contractor becomes aware of the incident or claim followed by a written detailed report within ten (10) days of verbal notification.

INDEMNIFICATION & HOLD HARMLESS

Contractor shall indemnify and hold harmless the County, its officers and employees from liabilities, damages, losses, and costs including but not limited to reasonable attorney fees, to the extent caused by the negligence, recklessness, or wrongful conduct of the Contractor and other persons employed or utilized by the Contractor in the performance of this contract.

Note: For Contractor's convenience, this certification form is enclosed and is made a part of the bid package.

CERTIFICATE OF INSURANCE

1. Certificates of insurance indicating the job site and evidencing all required coverage must be submitted not less than 10 days prior to the commencement of any of the work. The certificate holder(s) shall be as follows: Okaloosa County, 5479A Old Bethel Road, Crestview, Florida, 32536.

2. The contractor shall provide a Certificate of Insurance to the County with a thirty (30) day notice of cancellation; ten (10) days' notice if cancellation is for nonpayment of premium.

3. In the event that the insurer is unable to accommodate the cancellation notice requirement, it shall be the responsibility of the contractor to provide the proper notice. Such notification shall be in writing by registered mail, return receipt requested, and addressed to the Okaloosa County Purchasing Department at 5479-A Old Bethel Road, Crestview, FL 32536.

4. In the event the contract term goes beyond the expiration date of the insurance policy, the contractor shall provide the County with an updated Certificate of insurance no later than ten (10) days prior to the expiration of the insurance currently in effect. The County reserves the right to suspend the contract until this requirement is met.

5. The certificate shall indicate if coverage is provided under a claims-made or occurrence form. If any coverage is provided on a claims-made form, the certificate will show a retroactive date, which should be the same date of the initial contract or prior.

6. All certificates shall be subject to Okaloosa County's approval of adequacy of protection and the satisfactory character of the Insurer.

7. All deductibles or SIRs, whether approved by Okaloosa County or not, shall be the Contractor's full responsibility. In particular, the Contractor shall afford full coverage as specified herein to entities listed as Additional Insured.

8. In no way will the entities listed as Additional Insured be responsible for, pay for, be damaged by, or limited to coverage required by this schedule due to the existence of a deductible or SIR.

GENERAL TERMS

Any type of insurance or increase of limits of liability not described above which, the Contractor required for its own protection or on account of statute shall be its own responsibility and at its own expense.

Any exclusions or provisions in the insurance maintained by the contractor that excludes coverage for work contemplated in this contract shall be deemed unacceptable and shall be considered breach of contract.

The carrying of the insurance described shall in no way be interpreted as relieving the Contractor of any responsibility under this contract.

Should the Contractor engage a subcontractor or sub-subcontractor, the same conditions will apply under this Agreement to each subcontractor and sub-subcontractor.

The Contractor hereby waives all rights of subrogation against Okaloosa County and its consultants and other indemnities of the Contractor under all the foregoing policies of insurance.

UMBRELLA INSURANCE

The Contractor shall have the right to meet the liability insurance requirements with the purchase of an umbrella insurance policy. In all instances, the combination of primary and umbrella liability coverage must equal or exceed the minimum liability insurance limits stated in this Agreement.

DELIVERY OF BIDS

Bid Opening shall be public, on the date and time specified on the NOTICE TO CONTRACTORS. It is the contractor's responsibility to assure that his bid is delivered at the proper time and place. Offers by telegram, facsimile, or telephone are NOT acceptable. NOTE: Crestview, Florida is <u>not a next-day-guaranteed delivery location</u> by delivery services.

<u>Liquidated Damages:</u>

In case of failure on the part of the Contractor to complete the work within the time(s) specified in the contract, or within such additional time(s) as may be granted by Okaloosa County, the County will suffer damage, the amount of which is difficult, if not impossible, to ascertain. Therefore, the Contractor shall pay to the County, as liquidated damages, the amount established in the schedule below for each calendar day of delay that actual completion extends beyond the time limit specified until such reasonable time as may be required for final completion of the work. In no way shall costs for liquidated damages be construed as penalty on the contractor.

Daily Charge

Original Contract Amount	**Per Calendar Day**
$50,000 and under	**$ 311**
Over $50,000 but less than $250,000	**$ 972**
$250,000 but less than $500,000	**$1584**
$500,000 but less than $2,500,000	**$1924**
$2,500,000 but less than $5,000,000	**$2694**
$5,000,000 but less than $10,000,000	**$3902**
$10,000,000 but less than $15,000,000	**$6102**
$15,000,000 but less than $20,000,000	**$7022**
$20,000,000 and over	**$7022**

Determination of Number of Days of Default: For all contracts, regardless of whether the contract time is stipulated in calendar days or working days, the default days shall be counted in calendar days. Construction Time is stipulated in Section 5 of the BID FORMS.

Conditions under which Liquidated Damages are Imposed: Should the Contractor or, in case of his default, the Surety, fail to complete the work within the time stipulated in the contract, or within such extra time as may have been granted by the County, the Contractor or, in case of his default, the Surety, shall pay to the County, not as a penalty, but as liquidated damages, the amount so due as determined by the Daily Charge requirements, as provided above.

Right of Collection: The County shall have the right to apply as payment on such liquidated damages any money which is due to the Contractor by the County.

Permitting Contractor to Finish Work: Permitting the Contractor to continue and to finish the work, or any part of it, after the expiration of the contract time allowed, including extensions of time granted to the Contractor, shall in no way act as a waiver on the part of the County the liquidated damages due under the contract.

Completion of Work by County: In case of default of the contract and the completion of the work by the County, the Contractor and his Surety shall be liable for the liquidated damages under the contract, but no liquidated damages shall be chargeable for any delay in the final completion of the work by the County due to any unreasonable action or delay on the part of the County.

END OF OKALOOSA COUNTY STANDARD CLAUSES

BID FORM

PROJECT IDENTIFICATION:

CONSTRUCTION OF SATTELLITE, CONCOURSE “C” AT VPS

CONTRACT IDENTIFICATION AND NUMBER:

Okaloosa County Bid No.: ITB AP 21-21

THIS BID IS SUBMITTED TO:

OKALOOSA COUNTY BOARD OF COUNTY COMMISSIONERS

1. The undersigned Contractor proposes and agrees, if this Bid is accepted, to enter into an agreement with Owner in the form included in these documents to perform and furnish all Work as specified or indicated in these documents for the Bid Price and within the Bid Times indicated in this Bid and in accordance with the other terms and conditions of these documents.

2. Contractor accepts all of the terms and conditions of the Invitation to Bid and Instructions to Contractors, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for one hundred twenty (120) days after the day of Bid opening. Contactor will sign and deliver the required number of counterparts of the Agreement with the Bonds and other documents required by the Project Requirements within fifteen (15) days after the date of Owner's Notice of Award.

3. In submitting this Bid, Contractor represents as more fully set forth in the Agreement, that:

(a) Contractor has examined and carefully studied the Project Documents and the following Addenda receipt of all which is hereby acknowledged: (List Addenda by Addendum Number and Date)

Addendum No. _____ Date _____

Addendum No. _____ Date _____

Addendum No. _____ Date _____

Addendum No. _____ Date _____

(b) Contractor has visited the site and become familiar with and is satisfied as to the general, local, and site conditions that may affect cost, progress, performance, and furnishing of the Work.

(c) Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, performance, and furnishing of the Work.

Contractor has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to the site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except underground facilities) which have

been identified in the Bid Documents. Contactor acknowledges that such reports and drawings are not Contract Documents and may not be complete for Contactor's purposes. Contactor acknowledges that Owner and Architect/Engineer do not assume responsibility for the accuracy or completeness of information and data shown or indicted in the Project Documents with respect to underground facilities at or contiguous to the site. Contactor has obtained and carefully studied (or assumes responsibility for having done so) all such additional or supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and underground facilities) at or contiguous to the site or otherwise which may affect cost progress, performance or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Contactor and safety precautions and programs incident thereto. Contactor does not consider that any additional examinations, investigations, explorations, tests, studies or data are necessary for the determination of this Bid for performance and furnishing of the Work in accordance with the times, price, and other terms and conditions of these Documents.

(e) Contractor is aware of the general nature of Work to be performed by Owner and others at the site that relates to Work for which this Bid is submitted as indicated in these documents.

(f) Contractor has correlated the information known to Contactor, information and observation obtained from visits to the site, reports and drawings identified in these documents and all additional examinations, investigations, explorations, tests, studies, and data with these documents.

(g) Contractor has given Architect/Engineer written notice of all conflicts, errors, ambiguities or discrepancies that Contractor has discovered in these documents and the written resolution thereof by Architect/Engineer is acceptable to Contractor, and these documents are generally sufficient to indicate and convey understanding of all terms and conditions for performing and furnishing the Work for which this Bid is submitted.

(h) This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm, or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization, or corporation; Contractor has not directly or indirectly induced or solicited any other Contractor to submit a false or sham Bid; Contractor has not solicited or induced any person, firm or corporation to refrain from Project; and Contractor has not sought by collusion to obtain for itself any advantage over any other Contractor or over Owner.

4. Contractor will complete the Work in accordance with these documents for the price found in the Bid Schedule.

5. **Contract Time**: Contractor agrees that Work will be substantially complete **290** calendar days after the date when the (NTP) Contract Time commences to run, and will be completed and ready for final inspection and final payment within **320** calendar days after the date when the (NTP) Contract Time commences to run. Further the contractor agrees that the concession shell spaces will be substantially complete by December 1, 2021, as a phase 1 completion of work requirement.

6. **Liquidated Damages**: Contractor accepts the provisions of the Agreement as to liquidated damages identified in the Okaloosa County Standard Clauses, in the event of failure to achieve substantial complete of the Work and the concession shell spaces within the Substantial Completion time and achieve final completion of the work within the Final Completion time as specified in the Agreement.

7. The following documents are attached to and made a condition of this Bid:

Bid Schedule (BF-7)

Bid Affidavit (BF-10)

Bid Bond (BF-12)

Contractor Qualifications and Requirements (BF-15)

Form of Noncollusion Affidavit (BF-18)

Certification of Non-Segregated Facilities (BF-20)

Sworn Statement on Public Entity Crimes (BF-22)

Certificate as to Corporate Principal (BF-26)

Certified Copy of Resolution of Board of Directors (BF-28)

Conflict of Interest Disclosure Form (BF-30)

Drug-Free Workplace Certification (BF-32)

Certification of Contractor Regarding Trench Safety (BF-34)

Indemnification and Hold Harmless (BF-36)

Insurance Compliance (BF-38)

Affidavit – Worker's Compensation (BF-40)

Recycled Content Form (BF-42)

Disadvantaged Business Enterprise Program (BF-44)

DBE Certificate of Compliance Form (BF-48)

Performance of Work by Subcontractors (BF-50)

E-Verify Compliance Certification (BF-52)

Cone of Silence (BF-54)

Buy American Certificate (BF-56)

Lobbying – 31 USC 1352 (BF-58)

Equal Employment Opportunity Report Statement (BF-60)

Vendors on Scrutinized Companies Lists (BF-62)

System Awards Management (BF-64)

Certification of Offeror/Contactor Regarding Tax Delinquency and Felony Convictions (BF-67)

Government Debarment and Suspension (BF-69)

Certification regarding Debarment & Suspension (BF-71)

Company Data (BF-72)

8. Communications concerning this Bid shall be addressed to the address of Contactor indicated below.

_____

_____

_____

_____

_____

f9. Terms used in this Bid which are defined in the Instructions to Contractors will have the meanings indicated in the Instructions.

10. Contractor acknowledges that the Basis of Award shall be the Total Bid Amount, price and other factors considered. The bid bond amount shall be in the amount of the Total Bid Amount.

SUBMITTED on _____ , 20___

State Contractor License No. _____

If Contractor is:

An Individual

By _____ (SEAL)
(Individual's Name)

doing business as _____

Business address: _____

_____

Phone No.: _____

A Partnership

By _____(SEAL)
(Firm Name)

_____
(General Partner)

Business address: _____

_____

Phone No.: _____

A Corporation

By _____(SEAL)
(Corporation Name)

_____
(State of Incorporation)

By _____(SEAL)
(Name of person authorized to sign)

_____
(Title)

(Corporate Seal)

Attest _____
(Secretary)

Business address: _____

_____

Phone No.: _____

Date of Qualification to do business is _____

A Joint Venture

By _____ (SEAL)
(Name)

_____
(Address)

By _____ (SEAL)
(Name)

_____
(Address)

Phone Number and Address for receipt of official communications

_____

_____

(Each joint venture must sign. The manner of signing for each individual, partnership and corporation that is a party to the joint venture should be in the manner indicated above).

Bid Schedule
CONSTRUCTION OF SATTELLITE CONCOURSE "C" at
VPS Destin – Fort Walton Beach Airport

Item No.	Item Description	Quantity	Unit	Unit Price	Amount
	BASE BID	1	1		
	ADD ALTERNATE NO 1	1	1		
	ADD ALTERNATE NO 2	1	1		
	ADD ALTERNATE NO 3	1	1		
	ADD ALTERNATE NO 4	1	1		
	ADD ALTERNATE NO 5	1	1		
	ADD ALTERNATE NO 6	1	1		
	ADD ALTERNATE NO 7	1	1		

TOTAL AMOUNT BID:

FOR ALL WORK REQUIRED TO PERFORM IN ACCORDANCE WITH THE CONSTRUCTION DRAWINGS, SPECIFICATIONS AND OTHER CONTRACT DOCUMENTS, INCLUDING ALL COSTS RELATED TO THE WORK, AND ANY REQUIRED PERMITS, TAXES, BONDS AND INSURANCE, THE UNDERSIGNED SUBMITS A TOTAL BID AMOUNT OF:

BASE BID + Alternates 1, 2, 3, 4, 5, 6 and 7 = TOTAL BID (amount in words):

_____Dollars and

_____cents

($_____)

(Total Amount Bid in numbers)

The Contactor represents that it has examined the site of the Work and informed itself fully in regard to all conditions pertaining to the place where the work is to be done; that it has examined the plans and specifications for the work and other Contract Documents relative thereto and has read all of the Addenda furnished prior to the opening of the Bids, as acknowledged below; and that it has otherwise fully informed itself regarding the nature, extent, scope and details of the Work to be performed.

If provided with a Notice of Intent to Award the Contract by the Owner, the Contactor shall execute and deliver to the Owner all of the documents required by the Contract Documents, including but not limited to, the Addendum to the Agreement and the Performance and Payment Bonds in the form contained in the Contract Documents, furnish the required evidence of the specified insurance coverages, furnish all necessary permits, license, materials, equipment, machinery, maintenance, tools, apparatus, means of transportation and labor necessary to complete the Work.

Dated and signed at _____, _____, this _____ day of _____, 2021.

_____
(Name of Contactor)

_____
(Authorized Signature)

_____
(Title)

_____
(Mailing Address)

_____
(City, State, Zip)

_____
(Federal ID No. or SS No.)

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BID AFFIDAVIT

The following affidavit must be executed in order that your quotation may be

considered. STATE OF _____

COUNTY OF _____

_____ of lawful age, being first duly sworn, upon his oath deposes and says: That he executed the accompanying Quotation of behalf of the Contractor therein named, and that he had lawful authority so to do, and said Contractor has not directly or indirectly, entered into any agreement, expressed or implied, with any Contractor or Contractors, having to its object the controlling of the price or amount of such quotation or any quotations, the limiting of the Quotation or Contractors, the parceling or farming out to any Contractor or Contractors, to other persons of any part of the contract or any of the subject matter or the Quotations, or of the profits thereof, and that he has not and will not divulge the sealed Quotation to any person whomsoever, except those having a partnership or other financial interest with him in said Quotation or Quotations, until after the sealed Quotation or Quotations are opened.

_____
[signature]

_____

[date]

STATE OF_____COUNTY OF _____

PERSONALLY APPEARED BEFORE ME, the undersigned authority,

[name of individual signing]

who, after first being sworn by me, affixed his/her signature in the space provided above on this_day of _____, 20___.

Subscribed and sworn to before me this_____day of_____, 2021.

My Commission Expires:

_____ _____

Notary Public

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BID BOND

CONTRACTOR *(Name and Address):*

_____

_____

_____

SURETY *(Name and Address of Principal Place of Business)*:

_____

_____

_____

OWNER *(Name and Address)*:

Okaloosa County Board of County Commissioners
1250 North Eglin Parkway
Shalimar, FL 32579

BID:

BID DUE DATE: _____

PROJECT *(Brief Description Including Location):*_____

Construction of Satellite Concourse "C" as Depicted in Contract Drawings and Specifications at Destin-Fort Walton Beach Airport

BOND:

BOND NUMBER: _____

DATE: *(Not later than Bid Due Date):* _____

PENAL SUM: _____

IN WITNESS WHEREOF, Surety and Contractor, intending to be legally bound hereby, subject to the terms printed on the reverse side hereof, do each because this Bid bond to be duly executed on its behalf by its authorized officer, agent, or representative.

CONTRACTOR	SURETY
_____ (Seal) Contractor's Name and Corporate Seal	_____ (Seal) Surety's Name and Corporate Seal
By: _____ Signature and Title	By: _____ Signature and Title (Attach Power of Attorney)
Attest: _____ Signature and Title	Attest: _____ Signature and Title

Note: (1) Above addresses are to be used for giving required notice.
(2) Any singular reference to Contractor, Surety, Owner or other party shall be considered plural where applicable.

EJCDC NO. 1910-28-C (1990 Edition)

1. Contractor and Surety, jointly and severally, bind themselves, their heirs, executors, administrators, successors and assigns to pay to OWNER upon default of Contractor the penal sum set forth on the face of this Bond.

2. Default of Contractor shall occur upon the failure of Contractor to deliver within the time required by the Project Documents the executed Agreement required by the Project Documents and any performance and payment bonds required by the Project Documents and Contract Documents.

3. This obligation shall be null and void if:

3.1. OWNER accepts Contractor's Bid and Contractor delivers within the time required by the Project Documents (or any extension thereof agreed to in writing by OWNER) the executed Agreement required by the Project Documents and any performance and payment bonds required by the Project Documents and Contract Documents, or

3.2 All Bids are rejected by OWNER, or

3.3 OWNER fails to issue a notice of award to Contractor within the time specified in the Project Documents (or any extension thereof agreed to in writing by Contractor and, if applicable, consented to by Surety when required by paragraph 5 hereof).

4. Payment under this Bond will be due and payable upon default of Contractor and within 30 calendar days after receipt by Contractor and Surety of written notice of default from OWNER, which notice will be given with reasonable promptness, identifying this Bond and the Project and including a statement of the amount due.

5. Surety waives notice of and any and all defenses based on or arising out of any time extension to issue notice of award agreed to in writing by OWNER and Contractor, provided that the time for issuing notice of award including extensions shall not in the aggregate exceed 120 days from Bid Due Date without Surety's written consent.

6. No suit or action shall commenced under this Bond prior to 30 calendar days after the notice of default required in paragraph 4 above is received by Contractor and Surety, and in no case later than one year after Bid Due Date.

7. Any suit or action under this Bond shall be commenced only in a court of competent jurisdiction located in the state in which the Project is located.

8. Notice required hereunder shall be in writing and sent to Contractor and Surety at their respective addresses shown on the face of this Bond. such notices may be sent by personal deliver, commercial courier or by United States Registered or Certified Mail, return receipt requested, postage pre-paid, and shall be deemed to be effective upon receipt by the party concerned.

9. Surety shall cause to be attached to this Bond a current and effective Power of Attorney evidencing the authority of the officer, agent or representative who executed this Bond on behalf of Surety to execute, seal and deliver such Bond and bind the Surety thereby.

10. This Bond is intended to conform to all applicable statutory requirements. Any applicable requirement of any applicable statute that has been omitted form this Bond shall be deemed to be included herein as if set forth at length. If any provision of any Bond conflicts with any applicable provision of any applicable statute, then the provision of said statute shall govern and the remainder of this Bond that is not in conflict therewith shall continue in full force and effect.

11. The term "Bid" as used herein includes a Bid, offer, or proposal as applicable.

CONTRACTOR QUALIFICATIONS and REQUIREMENTS

A company desiring to do business with the County and bid on the subject project must be a licensed Florida contractor and show proof of such current and active licensure. The contractor will hold a certified or registered license that is approved at the state level through the Department of Business and Professional Regulation under the Florida Construction Industry Licensing Board. The proposer will also provide notice of any additional licensure such as building contractor or general contractor. Further, if performing types of work related to roads or airfield pavements, bridge or other related transportation construction contracts greater than $250,000.00, Florida Law (Chapter 337.14 F.S.) and Rules of the State of Florida, Department of Transportation, (Chapter 14-22, F.A.C.) requires contractors to be prequalified with the Florida Department of Transportation in order to bid for the subject work. FDOT prequalification proof is required at the time of bid submittal. Information can be obtained by visiting this link:

https://www.fdot.gov/contracts/prequal-info/prequalified.shtm

The undersigned guarantees the accuracy of all statements and answers herein contained. (Please print in ink).

1. How many years has your firm been in business as a Contractor?

2. List up to three (3) projects of this nature that you have completed in the last three (3) years, and give the name, address and telephone number of a reference from each. Also give the completion date, the original contract bid price and the completed cost of each project listed.

3. List projects presently under construction by your firm the dollar volume of the contract and the percentage completion of the contract.

4. Have you ever failed to complete work awarded to you; if so, state where and why.

_____

_____

_____

5. Do you plan to sublet any part of this work? If so, give details.

6. What equipment do you own that is available for this work?

7. What equipment do you plan to rent or purchase for this work?

8. Have you ever performed work under the direction of a Professional Architect/Engineer or Registered Architect? If so, list up to three (3) such firms giving the name of the firm, its address, telephone number and the name of the project. (List most recent projects).

9. Give the name, address and telephone number of an individual who represents each of the following and whom the Owner may contact to investigate your financial responsibility: a surety, a bank, and a major material supplier.

10. Provide a financial statement for your company. This should include a balance and income statement for your most recent fiscal year. A certified audit is preferred but not required. Use an insert sheet, if needed. Only three (3) lowest contactors shall submit this information (if requested by Owner) to the Owner within two (2) business days of the opening of the Bids.

11. State the true, exact, correct and complete name of the partnership, corporation or trade name under which you do business, and the address of the place of business. (If a corporation, state the name of all partners. If a trade name, state the names of the individuals who do business under the trade name.) It is absolutely necessary that information be furnished.

_____

Correct Name of Contractor _____

(a) The business is a _____

(b) The address of principal place of business is:

_____

_____

(c) The names of the corporate officers, or partners, or individuals doing business under a trade name, are as follows:

_____

_____

_____

_____

FORM OF NONCOLLUSION AFFIDAVIT

(This Affidavit is Part of Bid)

STATE OF _____

COUNTY OF _____

_____Being

first duly sworn, deposes and says that he is

_____(Sole owner, a partner, president, secretary, etc.) of

_____ the party making the foregoing Proposal or BID that such BID is genuine and not collusive or sham; that said CONTRACTOR has not colluded, conspired, connived, or agreed, directly or indirectly, with any CONTRACTOR or person, to put in a sham BID, or that such other person shall refrain from the project, and has not in any manner, directly or indirectly sought by agreement or collusion, or communication or conference, with any person, to fix the Bid Price of affiant or any other CONTRACTOR, or to fix any overhead, profit or cost element of said Bid Price, or of that of any other CONTRACTOR, or to secure any advantage against OWNER any person interested in the proposed Contract; and that all statements in said Proposal or Bid are true; and further, that such CONTRACTOR has not, directly or indirectly submitted this BID, or the contents thereof, or divulged information or date relative thereto to any association or to any member or agent thereof.

_____(Contractor)

Sworn to an subscribed before me this _____ day of

_____, 20___.

Notary Public in and for

_____ County,

_____.

My Commission Expires:

_____, 20___.

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CERTIFICATION OF NON-SEGREGATED FACILITIES

(Must be completed and submitted with the Bid)

The Contractor certifies that it does not maintain or provide for its employee any segregated facilities at any segregated facilities at any of its establishments, and that it does not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The Contractor certifies further that it will not maintain or provide for its employees segregated facilities at any of its establishments, and that it will not permit its employees to perform their services at any location under its control where segregated facilities are maintained. The Contractor agrees that a breach of this certification is a violation of the equal opportunity clause in this contract. As used in this certification, the term “segregated facilities” means any waiting room, work areas, restrooms and washrooms, restaurants and other eating areas, parking lots, drinking fountains, recreation or entertainment areas, transportation and housing facilities provided for employees which are segregated by explicit directive or are in fact segregated on basis of race, color, religion, or national origin, because of habit, local custom, or any other reason. The Contractor agrees that (except where it has obtained identical certification from proposed subcontractors for the specific time period) it will obtain identical certifications from proposed subcontractors prior to the award of subcontracts exceeding $10,000 which are not exempt from the provisions of the equal opportunity clause, and that it will retain such certification in its files.

(Name of Contractor) _____

By: _____

Title: _____

Dated: _____

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SWORN STATEMENT UNDER SECTION 287.133 (3) (a),
FLORIDA STATUTES, ON PUBLIC ENTITY CRIMES

THIS FORM MUST BE SIGNED AND SWORN IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICIAL AUTHORIZED TO ADMINISTER OATHS.

1. This sworn statement is submitted to_____
[print name of public entity]

by_____
[print individuals name and title]

for_____
[print name of entity submitting sworn statement]

whose business is_____and (if applicable) its Federal Employer Identification Number (FEIN) is_____(If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement:_____.)

2. I understand that a "public entity crime" as defined in Section 287.133 (1) (g), Florida Statutes, means a violation of any state or federal law by a person with respect to and directly related to the transaction of business with any public entity or with an agency or political subdivision of any other state or of the United States, including, but not limited to, any bid or contract for goods or services to be provided to any public entity or an agency or political subdivision of any other state or of the United States and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, or material misrepresentation.

3. I understand that "convicted" or "conviction" as defined in Section 287.133 (1) (b), Florida Statutes, means a finding of guilt or a conviction of a public entity crime, with or without an adjudication of guilt, in any federal or state trial court of record relating to charges brought by indictment or information after July 1, 1989, as a result of a jury verdict, non-jury trial, or entry of a plea of guilty or nolo contendere.

4. I understand that an "affiliate" as defined in Section 287.133 (1) (a), Florida Statutes, means:

A. A predecessor or successor of a person convicted of a public entity crime; or

B. An entity under the control of any natural person who is active in the management of the entity and who has been convicted of a public entity crime. The term "affiliate" includes those officers, directors, executives, partners, shareholders, employees, members and agents who are active in the management of an affiliate. The ownership by one person of shares constituting a controlling interest in another person, or a pooling of equipment or income among persons when not for fair market value under an arm's length agreement, shall be a prima facie case that one person controls another person. A person who knowingly enters into a joint venture with a person who has been convicted of a public entity crime in Florida during the preceding 36 months shall be considered an affiliate.

5. I understand that a “person" as defined in Section 287.133 (1) (e) Florida Statutes, means any natural person or entity organized under the laws of any state or of the United States with the legal power to enter into a binding contract and which bids or applies to bid on contracts

for the provision of goods or services let by a public entity, or which otherwise transacts or applies to transact business with a public entity. The term "person" includes those officers, directors, executives, partners, shareholders, and employees, members, and agents who are active in management of an entity.

6. Based on information and belief, the statement which I have marked below is true and in relation to the entity submitting this sworn statement. **[Indicate which statement applies.]**

___ Neither the entity submitting this sworn statement, nor any of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, nor any affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989.

___ The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989.

___ The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989. However, there has been a subsequent proceeding before a Hearing Officer of the State of Florida, Division of Administrative Hearings and the Final Order entered by the Hearing Officer determined that it was not in the public interest to place the submitting this sworn statement on the convicted vendor list. **[attach a copy of the final order]**

I UNDERSTAND THAT THE SUBMISSION OF THIS FORM TO THE CONTRACTING OFFICER FOR THE PUBLIC ENTITY IDENTIFIED IN PARAGRAPH 1 (ONE) ABOVE IS FOR THAT PUBLIC ENTITY ONLY AND, THAT THIS FORM IS VALID THOROUGH DECEMBER 31 OF THE CALENDAR YEAR IN WHICH IT IS FILED. I ALSO UNDERSTAND THAT I AM REQUIRED TO INFORM THE PUBLIC ENTITY PRIOR TO ENTERING INTO A CONTRACT IN EXCESS OF THE THRESHOLD AMOUNT PROVIDED IN SECTION 287.107, FLORIDA STATUTES FOR CATEGORY TWO ON ANY CHANGE IN THE INFORMATION CONTAINED IN THIS FORM.

_____
[signature]

_____
[date]

STATE OF_____COUNTY OF _____

PERSONALLY APPEARED BEFORE ME, the undersigned authority,

[name of individual signing] _____

who, after first being sworn by me, affixed his/her signature in the space provided above on this _____day of_____, 20___.

Subscribed and sworn to before me this_____day of_____, 20_.

My Commission Expires:

_____ _____

Notary Public

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CERTIFICATE AS TO CORPORATE PRINCIPAL

I,_____, certify that I am the Secretary of the Corporation named as Principal in the within bond; that_____who signed the bond on behalf of the Principal, was then _____ of said Corporation; that I know his/her signature, and his/her signature hereto is genuine; and that said bond was duly signed, sealed, and attested for and in behalf of said Corporation by authority of its governing body.

_____

Secretary (Corporate Seal)

STATE OF FLORIDA
COUNTY OF

Before me, a Notary Public, duly commissioned, qualified and acting, personally appeared _____ to me well known, who being my first duly sworn upon oath, says that he/she is the Attorney-in-Fact, for the_____and that he has been authorized by_____to execute the foregoing bond on behalf of the Contractor named therein in favor of Okaloosa County.

Subscribed and sworn to before me this____day of_, 20__, A.D.

[Attach Power of Attorney to Original Bid Bond and Financial Statement from Surety Company]

_____

Notary Public
State of Florida-at-Large

My commission Expires:

_____

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CERTIFIED COPY OF RESOLUTION OF
BOARD OF DIRECTORS OF

_____
(NAME OF CORPORATION)

"RESOLVED that, _____
(Person Authorized to Sign)
(Title) (Title)

of _____
(Name of Corporation)

is authorized to sign and submit the Bid of this corporation for the following Project:

CONSTRUCTION OF SATELLITE CONCOURSE 'C' AT WEST APRON EXPANSION AND INFRASTRUCTURE AT VPS

and to include in such bid the certificate as to non-collusion, and for any inaccuracies or misstatements in such certificate this corporate Contractor shall be liable under the penalties of perjury.

The foregoing is a true and correct copy of the resolution adopted by

_____
(NAME OF CORPORATION)

at a meeting of its Board of Directors held on the_____ day of _____, 20__.

By _____

Title _____

(SEAL)

The above form must be completed if the Contractor is a Corporation.

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CONFLICT OF INTEREST DISCLOSURE FORM

For purposes of determining any possible conflict of interest, all contractors/proposers, must disclose if any Okaloosa Board of County Commissioner, employee(s), elected officials(s), or if any of its agencies is also an owner, corporate officer, agency, employee, etc., of their business.

Indicate either "yes" (a county employee, elected official, or agency is also associated with your business), or "no." If yes, give person(s) name(s) and position(s) with your business.

YES _____ NO _____

NAME(S) POSITION(S)

_____

_____

_____

_____

FIRM NAME: _____

BY (PRINTED): _____

BY (SIGNATURE): _____

TITLE: _____

ADDRESS: _____

EMAIL: _____

PHONE NO.:_____

DATE: _____

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DRUG-FREE WORKPLACE CERTIFICATION

THE BELOW SIGNED CONTRACTOR CERTIFIES that it has implemented a drug-free workplace program. In order to have a drug-free workplace program, a business shall:

1. Publish a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of a controlled substance is prohibited in the workplace and specifying the actions that will be taken against employees for violations of such prohibition.

2. Inform employees about the dangers of drug abuse in the workplace, the business's policy of maintaining a drug-free workplace, any available drug counseling, rehabilitation and employee assistance programs, and the penalties that may be imposed upon employees for drug abuse violations.

3. Give each employee engaged in providing the commodities or contractual services that are under bid a copy of the statement specified in subsection 1.

4. In the statement specified in subsection 1, notify the employees that, as a condition of working on the commodities or contractual services that are under bid, the employee will abide by the terms of the statement and will notify the employer of any conviction of, or plea of guilty or nolo contendere to, to any violation of Chapter 893 or of any controlled substance law of the United States or any state, for a violation occurring in the workplace no later than five (5) days after such conviction.

5. Impose a sanction on, or require the satisfactory participation in drug abuse assistance or rehabilitation program if such is available in the employee's community, by any employee who is convicted.

6. Make a good faith effort to continue to maintain a drug-free workplace through implementation of this section.

As the person authorized to sign this statement, I certify that this firm complies fully with the above requirements.

DATE: _____

COMPANY: _____ SIGNATURE: _____

ADDRESS: _____NAME: _____
(Typed or Printed)

_____TITLE: _____

PHONE #: _____

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CERTIFICATION OF CONTRACTOR REGARDING TRENCH SAFETY

This certification is required pursuant to the Trench Safety Act, Chapter90-98, Florida Statutes regarding Trench Safety. The Act specifically incorporates the Occupational Safety and Health Administration's excavation safety standards, 29 CFR S. 1928.650 Subpart P as the state standard. Any revision to OSHA's safety standards that are consistent with the Florida Statutes shall also be complied with upon its effective date. The act requires that any contactor or prospective contractor, or any of their proposed subcontractors, shall provide written assurance that the contractor will comply with the applicable trench safety standards

NAME AND ADDRESS OF CONTRACTOR (Include Zip Code)

_____

_____

_____

_____

1. Contractor agrees that he is aware of the Trench Safety Act and the requirements of the Act.

Yes___ No _____

2. Contractors agrees to comply with all applicable trench safety standards as set forth in the Act and as referenced in the Act.

Yes___ No _____

NAME AND TITLE OF SIGNER (Please Print or Type)

_____

SIGNATURE_____ DATE _____

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INDEMNIFICATION AND HOLD HARMLESS

CONTRACTOR shall indemnify and hold harmless COUNTY, its officers and employees from liabilities, damages, losses, and costs including but not limited to reasonable attorney fees, to the extent caused by the negligence, recklessness, or intentional wrongful conduct of the CONTRACTOR and other persons employed or utilized by the CONTRACTOR in the performance of this Agreement.

Contractor's Company Name	Authorized Signature – Manual
Physical Address	Authorized Signature – Typed
Mailing Address	Title
Phone Number	FAX Number
Cellular Number	After-Hours Number(s)
Date	

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INSURANCE COMPLIANCE

This form is to be completed and signed the Contractor and by your insurance agent/carrier certifying that your policy either meets the insurance requirements (as specified in page BOC-2 to BOC-6) or that the insurance company has reviewed the bid requirements and certifies that you were bid any price increase due to required coverage.

CONTRACTOR

I certify that the insurance requirements have been reviewed.

Company Name _____

Address_____

Representative

Name _____

Title_____

Phone Number _____

INSURANCE COMPANY

I certify that the insurance requirements have been reviewed with the above contractor.

Company Name _____

Address_____

Representative

Name _____

Title_____

Phone Number _____

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AFFIDAVIT - WORKER'S COMPENSATION

State of _____

County of _____

SS:_____

of _____

being duly sworn, deposes and says that he now carries or that he has applied for a Worker's Compensation Policy to cover the operations, as set forth in the preceding contract, and to comply with the provisions thereof.

Signed: _____

Subscribed and sworn to before me this_____day of__, 20 __

Notary Public

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RECYCLED CONTENT FORM

RECYCLED CONTENT INFORMATION:

1. Is the material in the above: VIRGIN_____or RECYCLED _____
(Check the applicable blank)
If RECYCLED, what percentage_____%.

Product Description:_____
_____
_____
_____

2. Is your product packaged and/or shipped in material containing recycled content?

Yes_____No_____

Specify: _____
_____
_____
_____
_____

3. Is your product recyclable after it has reached its intended end use?

Yes_____No_____

Specify: _____
_____
_____
_____
_____

The above is not applicable if there is only a personal service involved with no product involvement.

Name of Contractor:

_____

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DISADVANTAGED BUSINESS ENTERPRISE PROGRAM

The following bid condition applies to this Department of Transportation (DOT) assisted contract. Submission of a bid/proposal by a prospective contractor shall constitute full acceptance of these bid conditions.

1. **DEFINITION -** Disadvantaged Business Enterprise (DBE) as used in this contract shall have the same meaning as defined in 49 CFR Part 26.

2. **POLICY -** It is the policy of DOT that DBE's as: defined in 49 CFR Part 26 shall have the maximum opportunity to participate in the performance of contracts and subcontracts financed in whole or in part with Federal funds. Consequently, the DBE requirements of 49 CFR Part 26 apply to this contract.

3. **OBLIGATION -** The contractor agrees to ensure that DBE's as defined In 49 CFR Part 26 have the maximum opportunity to participate in the performance of contracts and subcontracts financed in whole or in part with Federal funds. In this regard, all contractors shall take all necessary and reasonable steps in accordance with 49 CFR Part 26 to ensure that DBE's have the maximum opportunity to compete for and perform contracts. Contractors shall not discriminate on the basis of race, color, national origin, or sex in the award and performance of DOT assisted contracts.

4. **COMPLIANCE -** All bidders, potential contractors, or subcontractors for this DOT assisted contract are hereby notified that failure to carry out the DOT policy and the DBE obligation, as set forth above, shall constitute a breach of contract which may result in termination of the contract or such other remedy as deemed appropriate by the owner.

5. **CONTRACT CLAUSE -** All bidders and potential contractors hereby assure that they will include the above clauses in all subcontracts, which offer further subcontracting opportunities.

6. **CONTRACT AWARD -** Bidders are hereby advised that meeting the DBE subcontract goal or making an acceptable good faith effort to meet said goal are conditions of being awarded this FDOT assigned contract.

   The owner proposes to award the contract to the lowest responsive and responsible bidder submitting a reasonable bid provided he has met the goal for DBE participation or, if failing to meet the goal, he has made an acceptable good faith effort to meet the established goal for DBE participation (if any). Bidder is advised that the owner reserves the right to reject any or all bids submitted.

7. **DBE PARTICIPATION GOAL – No specific DBE goal has been established for this project; however, the contractor must make a good faith effort to include as much DBE participation as possible and must document the anticipated DBE participation on the next page.**

8. **AVAILABLE DBE'S –** The FDOT maintains an online searchable database of DBE firms at https://www3.dot.state.fl.us/equalopportunityoffice/biznet. This program contains listing of DBE's (certified and noncertified). Bidders are encouraged to inspect this list to assist in locating DBEs for the work. Other DBEs may be added to the list in accordance with the owner's approved DBE program. Credit toward the DBE goal will not be counted unless the DBE to be used can be certified by the owner.

9. CONTRACTOR'S REQUIRED SUBMISSION - The owner requires the submission of the following information with the bid:

DISADVANTAGED BUSINESS ENTERPRISE PROGRAM

MBE's

MBE Subcontractors Names/Addresses/ Identity	Subcontract Work Item	Dollar Value of Subcontract Work
_____	_____	_____
_____	_____	_____
_____	_____	_____

WBE's

Women Subcontractors Names/Addresses/ Identity	Subcontract Work Item	Dollar Value of Subcontract Work
_____	_____	_____
_____	_____	_____
_____	_____	_____

OSE's

Other Socially and Economically Disadvantaged Subcontractors within the DBE Group Names/Addresses/ Identity	Subcontract Work Item	Dollar Value of Subcontract Work
_____	_____	_____
_____	_____	_____
_____	_____	_____

Total Dollar Value of Subcontract Work _____

Total Dollar Value of Basic Bid _____

Total DBE Percent _____ %

* (Black, Hispanic, Asian American, American Indian, and other economically disadvantaged.)

If the Contractor fails to meet the contract goal established in Section 7 above, the following information must be submitted prior to contract award to assist the owner in determining whether or not the contractor made acceptable good faith efforts to meet the contract goal. This information (when applicable), as well as the DBE information, should be submitted as specified in Section 9 above.

Suggested guidance for use in determining if good faith efforts were made by a contractor are included in 49 CFR Part 26.

A list of the efforts that a contractor may make and the owner may use in making a determination as to the acceptability of a contractor's efforts to meet the goal as included in 49 CFR Part 26 are as follows:

a. **Whether the contractor attended any pre-solicitation or pre-bid meetings that were scheduled by the recipient to inform DBE's of contracting and subcontracting opportunities;**

b. Whether the contractor advertised in general circulation, trade association, and minority-focus media concerning the subcontracting opportunities;

c. Whether the contractor provided written notice to a reasonable number of specific DBE's that their interest in the contract was being solicited in sufficient time to allow the DBE's to participate effectively;

d. Whether the contractor followed up initial solicitations of interest by contacting DBE's to determine with certainty whether the DBE's were interested;

e. Whether the contractor selected portions of work to be performed by DBE's in order to increase the likelihood of meeting the DBE goal (including, where appropriate, breaking down contracts into economically feasible units to facilitate DBE participation);

f. Whether the contractor provided interested DBE's with adequate information about the plans, specifications, and requirements of the contract;

g. Whether the contractor negotiated in good faith with interested DBE's, not rejecting DBE's as unqualified without sound reasons based on a thorough investigation of their capabilities.

h. **Whether the contractor made efforts to assist interested DBE's in obtaining bonding, lines of credit, or insurance required by the recipient or contractor;**

and

i. Whether the contractor effectively used the services of available minority community organizations; minority contractors' groups; local and state

Federal Minority Business Assistance Offices; and other organizations that provide assistance in the recruitment and placement of DBE's.

NOTE: The nine items set forth above are merely suggested criteria and the owner may specify that you submit information on certain other actions a contractor took to secure DBE participation in an effort to meet the goals. A contractor may also submit to the owner other information on efforts to meet the goals.

CONTRACTOR ASSURANCE - The bidder hereby assures that he will meet one of the following as appropriate:

a. The DBE participation goal as established in the General Conditions.

b. The DBE participation percentage as shown in Section 9, which was submitted as a condition of contract award.

Agreements between bidder/proposer and a DBE in which the DBE promises not to provide subcontracting quotations to other bidders/proposers are prohibited. The bidder shall make a good faith effort to replace a DBE subcontract that is unable to perform successfully with another DBE subcontractor. Substitution must be coordinated and approved by the owner.

The bidder shall establish and maintain records and submit regular reports, as required, which will identify and assess progress in achieving DBE subcontract goals and other DBE affirmative action efforts.

11. PROMPT PAYMENT - The prime contractor agrees to pay each subcontractor under this prime contract for satisfactory performance of its contract no later than **10** days from the receipt of each payment the prime contractor receives from the owner. The prime contractor agrees further to return retainage payments to each subcontractor within **10** days after the subcontractor's work is satisfactorily completed. Any delay or postponement of payment from the above referenced time frame may occur only for good cause following written approval of the owner. This clause applies to both DBE and non-DBE subcontractors.

DBE CERTIFICATE OF COMPLIANCE FORM

The Florida Department of Transportation maintains an online searchable database of DBE firms at (https://www3.dot.state.fl.us/equalopportunityoffice/biznet).

Okaloosa County intends to utilize and implement this program in the awarding of this contract.

This is to certify that I have reviewed the plan, bid evaluation procedure, and DBE directory and will make all reasonable efforts to include DBE Contractors as outlined in pages OC-8 through OC-11.

Contractor's Signature	Date
Title	Notary Public

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PERFORMANCE OF WORK BY SUBCONTRACTORS

The CONTRACTOR hereby states that he proposes, if awarded the Contract, to use the following subcontractors on this project: List below all proposed subcontractors and trade specialties. (List only one subcontractor for each item.)

	Items of Work (Describe)	**Subcontractors**
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

Estimated Total Cost of Items that CONTRACTOR states will be performed by Subcontractor:

($_____)

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E-VERIFY COMPLIANCE CERTIFICATION

In accordance with Okaloosa County Policy and Executive Order Number 11-116 from the office of the Governor of the State of Florida, Bidder hereby certifies that the U.S. Department of Homeland Security's E-Verify system will be used to verify the employment eligibility of all new employees hired by the contractor during the contract term, and shall expressly require any subcontractors performing work or providing services pursuant to the contract to likewise utilize the U.S. Department of Homeland Security's E-Verify system to verify the employment eligibility of all new employees hired by the subcontractor during the contract term; and shall provide documentation of such verification to the OWNER upon request.

As the person authorized to sign this statement, I certify that this company complies/will comply fully with the above requirements.

DATE: _____ SIGNATURE: _____

COMPANY: _____ NAME:
_____

(Typed or Printed)

ADDRESS: _____ TITLE: _____

_____

E-MAIL: _____

PHONE NO.: _____

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CONE OF SILENCE

The Board of County Commissioners have established a solicitation silence policy **(Cone of Silence)** that prohibits oral and written communication regarding all formal solicitations for goods and services (ITB, RFP, ITQ, ITN, and RFQ) or other competitive solicitation between the contactor (or its agents or representatives) or other entity with the potential for a financial interest in the award (or their respective agents or representatives) regarding such competitive solicitation, and any County Commissioner or County employee, selection committee member or other persons authorized to act on behalf of the Board including the County's Architect, Architect/Engineer or their sub consultants, or anyone designated to provide a recommendation to award a particular contract, other than the Purchasing Department Staff.

The period commences from the time of advertisement until all parties have signed the contract.

Any information thought to affect the committee or staff recommendation submitted after bids are due, should be directed to the Purchasing Manager or an appointed representative. It shall be the Purchasing Manager's decision whether to consider this information in the decision process.

Any violation of this policy shall be grounds to disqualify the contactor from consideration during the selection process.

All contactors must agree to comply with this policy by signing the following statement and including it with their submittal.

I_____(Signature) representing_____
(Company Name) on this _____ day of_____, 20____hereby agree to abide by the County's "Cone of Silence Clause" and understand violation of this policy shall result in disqualification of my proposal/submittal.

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BUY AMERICAN CERTIFICATE

Except for those items listed by the Contactor below or on a separate and clearly identified attachment to this Bid, the Contactor hereby certifies that steel and each manufactured product, is produced in the United States and that components of unknown origin are considered to have been produced or manufactured outside the United States.

PRODUCT COUNTRY OF ORIGIN

_____

_____

_____

_____

_____

_____
(Name of Contactor)

By: _____

Title: _____

Dated: _____

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LOBBYING- 31 U.S.C. 1352, 49 CFR PART 19, 49 CFR PART 20

APPENDIX A, 49 CFR PART 20—CERTIFICATION REGARDING LOBBYING
Certification for Contracts, Grants, Loans, and Cooperative Agreements
The undersigned (Contractor) certifies, to the best of his or her knowledge and belief, that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

2. If any funds other than Federal appropriated funds have been paid or will be paid to any person for making the lobbying contacts to an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form—LLL, “Disclosure Form to Report Lobbying,” in accordance with its instructions [as amended by ”Government wide Guidance for New Restrictions on Lobbying,” 61 Fed. Reg. 1413 (1/19/96). Note: Language in paragraph (2) herein has been modified in accordance with Section 10 of the Lobbying Disclosure Act of 1995 (P.L. 104-65, to be codified at 2 U.S.C. 1601, et seq.)

3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly. This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by 31, U.S.C. 1352 (as amended by the Lobbying Disclosure Act of 1995). Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

Note: Pursuant to 31 U.S.C. 1352(c)(1)-(2)(A), any person who makes a prohibited expenditure or fails to file or amend a required certification or disclosure form shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such expenditure or failure.

The Contractor,_____, certifies or affirms the truthfulness and accuracy of each statement of its certification and disclosure, if any. In addition, the Contractor understands and agrees that the provisions of 31 U.S.C. A 3801, *et seq, apply* to this certification and disclosure, if any.

_____Signature of Contractor’s Authorized Official

_____Name and Title of Contractor’s Authorized Official

_____ Date

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EQUAL EMPLOYMENT OPPORTUNITY REPORT STATEMENT

Section 60-1.7(b) of the Regulations of the Secretary of Labor requires each bidder or prospective prime Contractor and proposed Subcontractor, where appropriate, to state in the bid or at the outset of negotiations for the Contract whether it has participated in any previous Contract or Subcontract subject to the equal opportunity clause; and if so, whether it has filed with the Joint Reporting Committee, the Director, an agency, or the former President's Committee on Equal Employment Opportunity all reports due under the applicable filing requirements. In any case in which a bidder or prospective prime Contractor or proposed Subcontractor which participated in a previous Contract subject to Executive Order 10925, 11114 or 111246 has not filed a report due under the applicable filing documents, no Contract or Subcontract shall be awarded unless such Contractor submits a report covering the delinquent period or such other period specified by the FAA or the Director, OFCCP.

The Bidder (Proposer) shall complete the following statement by checking the appropriate boxes. Failure to complete these blanks may be grounds for rejection of bid.

1. The Bidder (Proposer) has (___) has not (___) developed and has on file at each establishment Affirmative Action Programs pursuant to 41 CFR 60-1.4 and 41 CFR 60-2.

2. The Bidder (Proposer) has (___) has not (___) participated in any previous Contract or Subcontract subject to the Equal Opportunity Clause prescribed by Executive Order 10925, or Executive Order 111114, or Executive Order 11246.

3. The Bidder (Proposer) has (___) has not (___) filed with the Joint Reporting Committee the annual compliance report on Standard Form 100 (EEO-1 Report).

4. The Bidder (Proposer) has (___) has not (___) submitted all compliance reports in connection with any such Contract due under the application filing requirements; and that representations indicating submission of required compliance reports signed by proposed Subcontractors will be obtained prior to award of Subcontractors.

5. The Bidder (Proposer) does (___) does not (___) employ fifty (50) or more employees.

If the Bidder (Proposer) has participated in a previous Contract subject to the equal opportunity clause and has not submitted compliance reports due under applicable filing requirements, the Bidder (Proposer) shall submit a compliance report on Standard Form 100. "Employee Information EEO-1" prior to the award of Contract.

Standard Form 100 is normally furnished to Contractors annually, based on a mailing list currently maintained by the Joint Reporting Committee. In the event a Contractor has not received the form, he may obtain it by writing to the following address: Joint Reporting Committee, 1800 G Street, Washington, D.C. 20506.

_____
(Name of Bidder)

By:_____
Signature

Title: _____
Title

Date:_____
*Must be the same signature on Bid Proposal

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VENDORS ON SCRUTINIZED COMPANIES LISTS

By executing this Certificate_____, the bid proposer, certifies that it is not: (1) listed on the Scrutinized Companies that Boycott Israel List, created pursuant to section 215.4725, Florida Statutes, (2) engaged in a boycott of Israel, (3) listed on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, created pursuant to section 215.473, Florida Statutes, or (4) engaged in business operations in Cuba or Syria. Pursuant to section 287.135(5), Florida Statutes, the County may disqualify the bid proper immediately or immediately terminate any agreement entered into for cause if the bid proposer is found to have submitted a false certification as to the above or if the Contractor is placed on the Scrutinized Companies that Boycott Israel List, is engaged in a boycott of Israel, has been placed on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or has been engaged in business operations in Cuba or Syria, during the term of the Agreement. If the County determines that the bid proposer has submitted a false certification, the County will provide written notice to the bid proposer. Unless the bid proposer demonstrates in writing, within 90 calendar days of receipt of the notice, that the County's determination of false certification was made in error, the County shall bring a civil action against the bid proposer. If the County's determination is upheld, a civil penalty shall apply, and the bid proposer will be ineligible to bid on any Agreement with a Florida agency or local governmental entity for three years after the date of County's determination of false certification by bid proposer.

As the person authorized to sign this statement, I certify that this firm complies fully with the above requirements.

DATE: _____

COMPANY: _____

ADDRESS: _____

_____

_____

PHONE NO.: _____

SIGNATURE: _____

NAME: _____
(Typed or Printed)

TITLE: _____

E-MAIL: _____

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SYSTEM FOR AWARD MANAGEMENT (OCT 2016)

(a) Definitions. As used in this provision.
"Electronic Funds Transfer (EFT) indicator" means a four-character suffix to the unique entity identifier. The suffix is assigned at the discretion of the commercial, nonprofit, or Government entity to establish additional System for Award Management records for identifying alternative EFT accounts (see subpart 32.11) for the same entity.
"Registered in the System for Award Management (SAM) database" means that.
(1) The Offeror has entered all mandatory information, including the unique entity identifier and the EFT indicator, if applicable, the Commercial and Government Entity (CAGE) code, as well as data required by the Federal Funding Accountability and Transparency Act of 2006 (see subpart 4.14) into the SAM database;
(2) The offeror has completed the Core, Assertions, and Representations and Certifications, and Points of Contact sections of the registration in the SAM database;
(3) The Government has validated all mandatory data fields, to include validation of the Taxpayer Identification Number (TIN) with the Internal Revenue Service (IRS). The offeror will be required to provide consent for TIN validation to the Government as a part of the SAM registration process; and
(4) The Government has marked the record "Active".
"Unique entity identifier" means a number or other identifier used to identify a specific commercial, nonprofit, or Government entity. See www.sam.gov for the designated entity for establishing unique entity identifiers.
(b)(1) By submission of an offer, the offeror acknowledges the requirement that a prospective awardee shall be registered in the SAM database prior to award, during performance, and through final payment of any contract, basic agreement, basic ordering agreement, or blanket purchasing agreement resulting from this solicitation.
(2) The Offeror shall enter, in the block with its name and address on the cover page of its offer, the annotation "Unique Entity Identifier" followed by the unique entity identifier that identifies the Offeror's name and address exactly as stated in the offer. The Offeror also shall enter its EFT indicator, if applicable. The unique entity identifier will be used by the Contracting Officer to verify that the Offeror is registered in the SAM database.
(c) If the Offeror does not have a unique entity identifier, it should contact the entity designated at www.sam.gov for establishment of the unique entity identifier directly to obtain one. The Offeror should be prepared to provide the following information:
(1) Company legal business name.
(2) Tradestyle, doing business, or other name by which your entity is commonly recognized.
(3) Company Physical Street Address, City, State, and Zip Code.
(4) Company Mailing Address, City, State and Zip Code (if separate from physical).
(5) Company telephone number.
(6) Date the company was started.
(7) Number of employees at your location.
(8) Chief executive officer/key manager.

(9) Line of business (industry).
(10) Company Headquarters name and address (reporting relationship within your entity).
(d) If the Offeror does not become registered in the SAM database in the time prescribed by the Contracting Officer, the Contracting Officer will proceed to award to the next otherwise successful registered Offeror.
(e) Processing time, which normally takes 48 hours, should be taken into consideration when registering. Offerors who are not registered should consider applying for registration immediately upon receipt of this solicitation.
(f) Offerors may obtain information on registration at https://www.acquisition.gov .

Offerors SAM information:

Entity Name: _____

Entity Address: _____

Duns Number: _____

CAGE Code: _____

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CERTIFICATION OF OFFERER/CONTACTOR REGARDING TAX DELINQUENCY AND FELONY CONVICTIONS

The applicant must complete the following two certification statements. The applicant must indicate its current status as it relates to tax delinquency and felony conviction by inserting a checkmark (✓) in the space following the applicable response. The applicant agrees that, if awarded a contract resulting from this solicitation, it will incorporate this provision for certification in all lower tier subcontracts.

Certifications

1) The applicant represents that it is ( ) is not ( ) a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

2) The applicant represents that it is ( ) is not ( ) is not a corporation that was convicted of a criminal violation under any Federal law within the preceding 24 months.

Note

If an applicant responds in the affirmative to either of the above representations, the applicant is ineligible to receive an award unless the sponsor has received notification from the agency suspension and debarment official (SDO) that the SDO has considered suspension or debarment and determined that further action is not required to protect the Government's interests. The applicant therefore must provide information to the owner about its tax liability or conviction to the Owner, who will then notify the FAA Airports District Office, which will then notify the agency's SDO to facilitate completion of the required considerations before award decisions are made.

Term Definitions

Felony conviction: Felony conviction means a conviction within the preceding twenty-four (24) months of a felony criminal violation under any Federal law and includes conviction of an offense defined in a section of the U.S. code that specifically classifies the offense as a felony and conviction of an offense that is classified as a felony under 18 U.S.C. § 3559.

Tax Delinquency: A tax delinquency is any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted, or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

DATE: _____ SIGNATURE: _____

COMPANY: _____ NAME: _____
(Typed or Printed)
TITLE: _____

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Government Debarment & Suspension

Instructions

1. By signing and submitting this form, the prospective lower tier participant is providing the certification set out in accordance with these instructions.
2. The certification in this clause is a material representation of fact upon which reliance was placed when this transaction was entered into. If it is later determined that the prospective lower tier participant knowingly rendered an erroneous certification, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension or debarment.
3. The prospective lower tier participant shall provide immediate written notice to the person(s) to which this proposal is submitted if at any time the prospective lower tier participant learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
4. The terms "covered transaction," "debarred," "suspended," "ineligible," "lower tier covered transaction," "participant," "person," "primary covered transaction," "principal," "proposal," and "voluntarily excluded," as used in this clause, have the meanings set out in the Definitions and Coverage sections of the rules implementing Executive Orders 12549, at Subpart C of OMB 2 C.F.R. Part 180 and 3000.332. You may contact the department or agency to which this proposal is being submitted for assistance in obtaining a copy of those regulations.
5. The prospective lower tier participant agrees by submitting this form that, should the proposed covered transaction be entered into, it shall not knowingly enter into any lower tier covered transaction with a person who is debarred, suspended, declared ineligible, or voluntarily excluded from participation in this covered transaction, unless authorized by the department or agency with which this transaction originated.
6. The prospective lower tier participant further agrees by submitting this form that it will include this clause titled "Certification Regarding Debarment, Suspension, Ineligibility and Voluntary Exclusion - Lower Tier Covered Transactions," without modification, in all lower tier covered transactions and in all solicitations for lower tier covered transactions.
7. A participant in a covered transaction may rely upon a certification of a prospective participant in a lower tier covered transaction that is not debarred, suspended, ineligible, or voluntarily excluded from the covered transaction, unless it knows that the certification is erroneous. A participant may decide the method and frequency by which it determines the eligibility of its principals. Each participant may, but is not required to, check the System for Award Management (SAM) database.
8. Nothing contained in the foregoing shall be construed to require establishment of a system of records in order to render in good faith the certification required by this clause. The knowledge and information of a participant is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

9. Except for transactions authorized under paragraph (5) of these instructions, if a participant in a covered transaction knowingly enters into a lower tier covered transaction with a person who is suspended, debarred, ineligible, or voluntarily excluded from participation in this transaction, in addition to other remedies available to the Federal Government, the department or agency with which this transaction originated may pursue available remedies, including suspension and/or debarment.

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Certification Regarding Debarment, Suspension,
Ineligibility and Voluntary Exclusion
Lower Tier Covered Transactions

The following statement is made in accordance with the Privacy Act of 1974 (5 U.S.C. § 552(a), as amended). This certification is required by the regulations implementing Executive Orders 12549, Debarment and Suspension, and OMB 2 C.F.R.
Part 180, Participants' responsibilities. The regulations were amended and published on August 31, 2005, in 70 Fed. Reg. 51865-51880.

[READ INSTRUCTIONS ON PREVIOUS PAGE BEFORE COMPLETING CERTIFICATION]

1. The prospective lower tier participant certifies, by submission of this proposal, that neither it nor its principals is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from participation in this transaction by any Federal or State department or agency;
2. Where the prospective lower tier participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal

_____
Printed Name and Title of Authorized Representative

_____ _____
Signature Date

COMPANY DATA

Contactor's Company Name: _____

Physical Address & Phone #:

_____
_____
_____
_____
_____

Contact Person (Typed-Printed): _____

Phone #: _____

Cell #: _____

Email: _____

Federal ID or SS #: _____

Contactor's License #: _____

Contactor's DUNS #: _____

Fax #: _____

Emergency #'s After Hours,
Weekends & Holidays: _____

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STANDARD FORM OF AGREEMENT

Draft Contract

Please note: this contract is a draft for bidder to view and understand the County's standard terms and conditions, it is subject to revisions. By submitting a bid/proposal bidder/respondent understands and acknowledges that the draft contract is not an offer. Bidders/respondents are not to sign this draft contract.

THIS AGREEMENT is dated as of the _____ day of _____ in the year 20___ by and between The Board of County Commissioners of Okaloosa County, Florida (hereinafter called Owner) and _____(hereinafter called Contractor).

Owner and Contractor, in consideration of the mutual covenants hereinafter set forth, agree as follows:

Article 1. WORK.

Contractor shall complete all Work as specified or indicated in the Contract Documents. The Work is generally described as follows:

CONSTRUCT SATELLITE CONCOURSE "C" AT THE DESTIN – FORT WALTON BEACH AIRPORT (VPS)

Article 2. ENGINEER.

The Project has been designed by

MLM MARTIN ARCHITECTS, INC.

who is hereinafter called Architect/Engineer and who is to act as Owner's representative, assume all duties and responsibilities and have the rights and authority assigned to Architect/Engineer in the Contract Documents in connection with completion of the Work in accordance with the Contract Documents

Article 3. CONTRACT TIMES.

3.1 The Work will be substantially completed within **290** calendar days after the date when the Contract Times commence to run as provided in paragraph 2.3 of the General Conditions. The project shall be deemed substantially complete upon completion of the asphalt pavement, concrete curb and sidewalk, fencing, and pavement markings. The Work will be completed and ready for final payment in accordance with paragraph 14.13 of the General Conditions within **320** calendar days after the date when the Contract Times commence to run.

3.2 *Liquidated Damages.* Owner and Contractor recognize that time is of the essence of this Agreement and that Owner will suffer financial loss if the Work is not completed within the times specified in paragraph 3.1 above, plus any extensions thereof allowed in accordance with Article 12

of the General Conditions. They also recognize the delays, expense and difficulties involved in proving the actual loss suffered by Owner if the Work is not completed on time. Accordingly, instead of requiring of such proof, Owner and Contractor agree that as liquidated damages for delay (but not as a penalty) Contractor shall pay Owner the amount specified in Paragraph 3.3 for each day that expires after the time specified in paragraph 3.1 for Substantial Completion until the Work is substantially complete. After Substantial Completion, if Contractor shall neglect, refuse, or fail to complete the remaining Work within the time specified in paragraph 3.1 for completion and readiness for final payment or any proper extension thereof granted by Owner, Contractor shall pay Owner the amount specified in Paragraph 3.3 for each day that expires after the time specified in paragraph 3.1 for completion and readiness for final payment. The Contractor hereby expressly waives and relinquishes any right which it may have to seek to characterize the liquidated damages as a penalty, which the parties agree represents a fair and reasonable estimate of the Owner's actual damages at the time of contracting if the Contractor fails to substantially complete the Work in a timely manner.

3.3.1 Liquidated Damages are based upon the original contract amount, as established by Okaloosa County. Liquidated damages, based upon the original contract amount of $_____, will be _____ dollars ($_____) per calendar day.

Article 4. CONTRACT PRICE.

Owner shall pay Contractor for completion of the Work in accordance with the Contract Documents an amount in current funds equal to the sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of that item as indicated in the Bid Schedule submitted in the Bid Form. The cost of this project is $_____ as per the attached Contractor bid.

As provided in paragraph 11.9 of the General Conditions estimated quantities are not guaranteed, and determinations of actual quantities and classification are to be made by Engineer as provided in paragraph 9.10 of the General Conditions. Unit prices have been computed as provided in paragraph 11.9.2 of the General Conditions.

Article 5. PAYMENT PROCEDURES

Contractor shall submit Application for Payment in accordance with Article 14 of the General Conditions. Applications for Payment will be processed by Engineer as provided in the General Conditions.

5.1 *Progress Payments; Retainage*. Owner shall make progress payments on account of the Contract Price on the basis of Contractor's Applications for Payment as recommended by Engineer, on or about the fifteenth (15th) day of each month during construction as provided in paragraphs 5.1.1 and 5.1.2 below. All such payments will be measured based on the number of units completed. Payments to the Contractor shall in no way imply approval or acceptance of Contractor's work.

5.1.1 Prior to and up to Substantial Completion, payments will be made in an amount equal to the percentage indicated below, but, in each case, less the aggregate of payments previously made and less such amounts as Engineer shall determine, or Owner may withhold, in

accordance with paragraph 14.7 of the General Conditions and Chapter 255.078 of Florida Statutes.

__95__% of Work completed (with the balance being retainage).

__95__% (with the balance being retainage) of materials and equipment not incorporated in the Work (but delivered, suitably stored and accompanied by documentation satisfactory to Owner as provided in paragraph 14.2 of the General Conditions).

5.1.2 Retainage requirements may be changed to reflect a proposed change to state regulatory statutes.

5.2 *Final Payment.* Upon final completion and acceptance of the Work in accordance with paragraph 14.13 of the General Conditions, Owner shall pay the remainder of the Contract Price as recommended by Engineer as provided in said paragraph 14.13.

5.2.1 Contractor's acceptance of final payment shall constitute a full waiver of any and all claims by Contractor against the County arising out of this Agreement or otherwise relating to the Project, except those previously made in writing and identified by Contractor as unsettled at the time of the final Application for Payment. Neither the acceptance of the Work nor payment by the County shall be deemed to be a waiver of the County's right to enforce any obligations of the Contractor hereunder or to the recovery of damages for defective Work not discovered by the Engineer or the County at the time of final inspection.

5.3 Payments Withheld

5.3.1 The Engineer or the County may decline to approve any Applications for Payment, or portions thereof, because of subsequently discovered evidence or subsequent inspections. The Engineer or the County may nullify the whole or any part of any inspections. The Engineer or the County may nullify the whole or any part of any approval for payment previously issued and the County may withhold any payments otherwise due Contractor under this Agreement or any other agreement between the County and the Contractor, to such extent as may be necessary in the County's opinion to protect it from loss because of:

5.3.1.1 Defective Work not remedied;
5.3.1.2 Third party claims filed or reasonable evidence indicating probable filing of such claims;
5.3.1.3 Failure of Contractor to make payment properly to subcontractors or for labor, materials or equipment;
5.3.1.4 Reasonable doubt that the Work can be completed for the unpaid balance of the Contract Amount;
5.3.1.5 Reasonable indication that the Work will not be completed within the Contract Time;
5.3.1.6 Unsatisfactory prosecution of the Work by the Contractor;
5.3.1.7 Failure to provide accurate and current "As-Builts"; or
5.3.1.8 Any other material breach of the Contract Documents.

5.3.2 If these conditions in Subsection 5.3.1 are not remedied or removed, the County may after three (3) days written notice, rectify the same at Contractor's expense. The County also may offset against any sums due Contractor the amount of any liquidated or unliquidated obligations of Contractor to the County, whether relating to or arising out of his Agreement or any other agreement between Contractor and the County.

5.4 Availability of Funds. The County's performance and obligation to pay under this Agreement is contingent upon annual appropriation for its purpose by the County Commission.

Article 6. CONTRACTOR'S REPRESENTATIONS.

In order to induce Owner to enter into this Agreement Contractor makes the following representations:

6.1 Contractor has examined and carefully studied the Contract Documents (including the Addenda listed in Article 7) and the other related data identified in the Project Documents including "technical data."

6.2 Contractor has visited the site and become familiar with and is satisfied as to the general, local, and site conditions that may affect cost, progress, performance or furnishing of the Work.

6.3 Contractor is familiar with and is satisfied as to all federal, state, and local Laws and Regulations that may affect cost, progress, performance and furnishing of the Work.

6.4 Contractor has carefully studied all reports of explorations and tests of subsurface conditions at or contiguous to site and all drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except Underground Facilities) which have been identified in the Supplementary Conditions as provided in paragraph 4.2.1 of the General Conditions. Contractor accepts the determination of the extent of the "technical data" contained in such reports and drawings upon which Contractor is entitled to rely as provided in paragraph 4.2 of the General Conditions. Contractor acknowledges that such reports and drawings are not Contract Documents and may not be complete for Contractor's purposes. Contractor acknowledges that Owner and Engineer do not assume responsibility for the accuracy or completeness of information and data shown or indicated in the Contract Documents with respect to Underground Facilities at or contiguous to the site. Contractor has obtained and carefully studied (or assumes responsibility for having done so) all such additional supplementary examinations, investigations, explorations, tests, studies, and data concerning conditions (surface, subsurface, and Underground Facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance, or furnishing of the Work or which relate to any aspect of the means, methods, techniques, sequences, and procedures of construction to be employed by Contractor and safety precautions, and programs incident thereto. Contractor does not consider that any additional examinations, investigations, explorations, tests, studies, or data are necessary for the performance and furnishing of the Work at the Contract Price, within the Contract Times and in accordance with the other terms and conditions of the Contract Documents.

6.5 Contractor is aware of the general nature of work to be performed by Owner and others at the site that relates to the Work as indicated in the Contract Documents.

6.6. Contractor has correlated the information known to Contractor, information and observation obtained from visits to the site, reports, and drawings identified in the Contract Documents and all additional examinations, investigations, explorations, tests, studies, and data with the Contract Documents.

6.7. Contractor has given Engineer written notice of all conflicts, errors, ambiguities or discrepancies that Contractor has discovered in the Contract Documents and the written resolution thereof by Engineer is acceptable to Contractor, and the Contract Documents are generally sufficient to indicate and convey understanding of all terms and conditions for performance and furnishing of the Work.

Article 7. CONTRACT DOCUMENTS

The Contract Documents that comprise the entire agreement between Owner and Contractor concerning the Work consist of the following:

7.1 **Attachment "A"**, Invitation to Bid & Respondent's Acknowledgment/Contractor's Submittal, ITB AP 21-21, **CONSTRUCT SATELLITE CONCOURSE 'C' AT DESTIN—FORT WALTON BEACH AIRPORT (VPS)** date of opening March 10, 2021 at 3:00 P.M. (CST) and any addenda thereto.

7.2 **Attachment "B", Federal Regulations,** attached hereto and made a part of the contract. All terms within the above referenced documents are in full force and effect and shall be binding upon both parties.

7.3 **Attachment "C" - Title VI List of Pertinent Nondiscrimination Acts and Authorities**

7.4 Plans, Drawings, and Technical Specifications

7.5 Any other documents necessary to clarify and memorialize the agreement between Contractor and Owner

Article 8. PUBLIC RECORDS

Any record created by either party in accordance with this Contract shall be retained and maintained in accordance with the public records law, Florida Statutes, Chapter 119.

IF THE CONSULTANT HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS CONTRACT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT OKALOOSA COUNTY RISK MANAGEMENT

DEPARTMENT AT 302 NORTH WILSON STREET, CRESTVIEW, FL 32536 PHONE: (850) 689-5977 riskinfo@myokaloosa.com

Consultant must comply with the public records laws, Florida Statute chapter 119, specifically Consultant must:

8.1 Keep and maintain public records required by the County to perform the service.

8.2 Upon request from the County's custodian of public records, provide the County with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in chapter 119 Florida Statutes or as otherwise provided by law.

8.3 Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the contract term and following completion of the contract if the consultant does not transfer the records to the County.

8.4 Upon completion of the contract, transfer, at no cost, to the County all public records in possession of the contractor or keep and maintain public records required by the County to perform the service. If the consultant transfers all public records to the public agency upon completion of the contract, the consultant shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the consultant keeps and maintains public records upon completion of the contract, the consultant shall meet all applicable requirements for retaining the public records. All records stored electronically must be provided to the public agency, upon the request from the public agency's custodian of public records, in a format that is compatible with the information technology systems of the public agency.

Article 9. AUDIT

The County and/or its designee shall have the right from time to time at its sole expense to audit the compliance by the Contractor with the terms, conditions, obligations, limitations, restrictions, and requirements of this Contract and such right shall extend for a period of three (3) years after termination of this Contract.

Article 10. TERMINATION FOR CONVENIENCE

Owner may at any time and for any reason terminate Contractor's services and work at Owner's convenience. Upon receipt of such notice, Contractor shall, unless the notice directs otherwise, immediately discontinue the work and placing of orders for materials, facilities and supplies in connection with the performance of this Agreement.

Upon such termination, Contractor shall be entitled to payment only as follows: (1) the actual cost of the work completed in conformity with this Agreement; plus, and (2) such other costs actually incurred by Contractor as are permitted by the prime contract and approved by Owner. There shall

be deducted from such sums as provided in this subparagraph the amount of any payments made to Contractor prior to the date of the termination of this Agreement. Contractor shall not be entitled to any claim or claim of lien against Owner for any additional compensation or damages in the event of such termination and payment. Further, Owner may terminate this contract immediately for failure of contractor to comply with Chapter 119, Florida Statutes.

Article 11. VIOLATIONS OF CHAPTER 119 FLORIDA STATUTES

The County reserves the right to terminate this agreement immediately for failure of Contractor to adhere to the requirements of Florida Statutes Chapter 119.

Article 12. MISCELLANEOUS.

12.1 Terms used in this Agreement which are defined in Article 1 of the General Conditions will have the meanings indicated in the General Conditions.

12.2 No assignment by a party hereto of any rights under or interests in the Contract Documents will be binding on another party hereto without the written consent of the party sought to be bound; and, specifically but without limitation, moneys that may become due and moneys that are due may not be assigned without such consent (except to the extent that the effect of this restriction may be limited by law), and unless specifically stated to the contrary in any written consent to an assignment no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents.

12.3 Owner and Contractor each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

12.4 Any provisions or part of the Contract Documents held to be void or unenforceable under any Law or Regulation shall be deemed stricken, and all remaining provisions shall continue to be valid and binding upon Owner and Contractor, who agree that the Contract Documents shall be reformed to replace such stricken provision or part thereof with a valid and enforceable provision that comes as close as possible to expressing the intention of the stricken provision.

IN WITNESS WHEREOF, Owner, and Contractor have signed this Agreement in triplicate. One counterpart each has been delivered to Owner, Contractor, and Engineer. All portions of the Contract Documents have been signed, initialed or identified by Owner, and Contractor, or identified by Engineer on their behalf.

This Agreement will be effective on _____, 20___ (which is the Effective Date of the Agreement).

Article 13. GOVERNING LAW, VENUE AND WAIVER OF JURY TRIAL.

This Agreement shall be interpreted and construed in accordance with and governed by the laws of the State of Florida. All parties agree and accept that jurisdiction of any dispute or controversy arising out of this Agreement, and any action involving the enforcement or interpretation of any rights hereunder shall be brought exclusively in the First Judicial Circuit in and for Okaloosa County, Florida, and venue for litigation arising out of this Agreement shall be exclusively in such state courts, forsaking any other jurisdiction which either party may claim by virtue of its residency or other jurisdictional device. In the event it becomes necessary for the County to file a lawsuit to enforce any term or provision under this Agreement, then the County shall be entitled to its costs and attorney's fees at the pretrial, trial and appellate levels. BY ENTERING INTO THIS AGREEMENT, CONTRACTOR AND COUNTY HEREBY EXPRESSLY WAIVE ANY RIGHTS EITHER PARTY MAY HAVE TO A TRIAL BY JURY OF ANY CIVIL LITIGATION RELATED TO THIS AGREEMENT. Nothing in this Agreement is intended to serve as a waiver of sovereign immunity, or of any other immunity, defense, or privilege enjoyed by the County pursuant to Section 768.28, Florida Statutes.

Article 14. CIVIL RIGHTS.

The Contractor agrees to comply with pertinent statutes, Executive Orders and such rules as are promulgated to ensure that no person shall, on the grounds of race, creed, color, national origin, sex, age, or disability be excluded from participating in any activity conducted with or benefiting from Federal assistance. This provision binds the Contractor and subcontractors from the bid solicitation period through the completion of the contract. This provision is in addition to that required by Title VI of the Civil Rights Act of 1964.

ARTICLE 15. COMPLIANCE WITH NONDISCRIMINATION REQUIREMENTS.

During the performance of this Agreement, the Contractor, for itself, its assignees, and successors in interest, agrees as follows:

a. Compliance with Regulations: The Contractor will comply with the Title VI List of Pertinent Nondiscrimination Acts and Authorities, as they may be amended from time to time, which are herein incorporated and attached hereto as Attachment "C".

b. Nondiscrimination: The Contractor, with regard to the work performed by it during the Agreement, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The Contractor will not participate directly or indirectly in the discrimination prohibited by the Nondiscrimination Acts and Authorities, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR part 21.

c. Solicitations for Subcontracts, including Procurements of Materials and Equipment: In all solicitations, either by competitive bidding or negotiation made by the Contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the Contractor of the contractor's obligations under this contract and the Nondiscrimination Acts and Authorities on the grounds of race, color, or national origin.

d. Information and Reports: The Contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the County or other governmental entity to be pertinent to ascertain compliance with such Nondiscrimination Acts and Authorities and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the Contractor will so certify to the County or the other governmental entity, as appropriate, and will set forth what efforts it has made to obtain the information.

e. Sanctions for Noncompliance: In the event of a Contractor's noncompliance with the non-discrimination provisions of this contract, the County will impose such contract sanctions as it or another applicable state or federal governmental entity may determine to be appropriate, including, but not limited to:

a. Withholding payments to the Contractor under the Agreement until the Contractor complies; and/or

b. Cancelling, terminating, or suspending the Agreement, in whole or in part.

f. Incorporation of Provisions: The Contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations, and directives issued pursuant thereto. The Contractor will take action with respect to any subcontract or procurement as the County may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the Contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the Contractor may request the County to enter into any litigation to protect the interests of the County. In addition, the Contractor may request the United States to enter into the litigation to protect the interests of the United States.

ARTICLE 16. COMPLIANCE WITH LAWS.

Contractor shall secure any and all permits, licenses and approvals that may be required in order to perform the Services, shall exercise full and complete authority over Contractor's personnel, shall comply with all workers' compensation, employer's liability and all other federal, state, county, and municipal laws, ordinances, rules and regulations required of an employer performing services such as the Services, and shall make all reports and remit all withholdings or other deductions from the compensation paid to Contractor's personnel as may be required by any federal, state, county, or municipal law, ordinance, rule, or regulation.

ARTICLE 17. CONFLICT OF INTEREST.

The Contractor covenants that it presently has no interest and shall not acquire any interest, directly or indirectly which could conflict in any manner or degree with the performance of the Services. The

Contractor further covenants that in the performance of this Agreement, no person having any such interest shall knowingly be employed by the Contractor. The Contractor guarantees that he/she has not offered or given to any member of, delegate to the Congress of the United States, any or part of this contract or to any benefit arising therefrom.

ARTICLE 18. INDEPENDENT CONTRACTOR.

Contractor enters into this Agreement as, and shall continue to be, an independent contractor. All services shall be performed only by Contractor and Contractor's employees. Under no circumstances shall Contractor or any of Contractor's employees look to the County as his/her employer, or as partner, agent or principal. Neither Contractor, nor any of Contractor's employees, shall be entitled to any benefits accorded to the County's employees, including without limitation worker's compensation, disability insurance, vacation or sick pay. Contractor shall be responsible for providing, at Contractor's expense, and in Contractor's name, unemployment, disability, worker's compensation and other insurance as well as licenses and permits usual and necessary for conducting the services to be provided under this Agreement.

ARTICLE 19. THIRD PARTY BENEFICIARIES.

It is specifically agreed between the parties executing this Agreement that it is not intended by any of the provisions of any part of the Agreement to create in the public or any member thereof, a third-party beneficiary under this Agreement, or to authorize anyone not a party to this Agreement to maintain a suit for personal injuries or property damage pursuant to the terms or provisions of this Agreement.

ARTICLE 20. INDEMNIFICATION AND WAIVER OF LIABILITY.

The Contractor agrees, to the fullest extent permitted by law, to defend, indemnify and hold harmless the County, its agents, representatives, officers, directors, officials and employees from and against claims, damages, losses and expenses (including but not limited to attorney's fees, court costs and costs of appellate proceedings) relating to, arising out of or resulting from the Contractor's negligent acts, errors, mistakes or omissions relating to professional Services performed under this Agreement. The Contractor's duty to defend, hold harmless and indemnify the County its agents, representatives, officers, directors, officials and employees shall arise in connection with any claim, damage, loss or expense that is attributable to bodily injury; sickness; disease; death; or injury to impairment, or destruction of tangible property including loss of use resulting therefrom, caused by any negligent acts, errors, mistakes or omissions related to Services in the performance of this Agreement including any person for whose acts, errors, mistakes or omissions the Contractor may be legally liable. The parties agree that TEN DOLLARS ($10.00) represents specific consideration to the Contractor for the indemnification set forth herein.

The waiver by a party of any breach or default in performance shall not be deemed to constitute a waiver of any other or succeeding breach or default. The failure of the County to enforce any of the provisions hereof shall not be construed to be a waiver of the right of the County thereafter to enforce such provisions.

ARTICLE 21. TAXES AND ASSESSMENTS.

Contractor agrees to pay all sales, use, or other taxes, assessments and other similar charges when due now or in the future, required by any local, state or federal law, including but not limited to such taxes and assessments as may from time to time be imposed by the County in accordance with this Agreement. Contractor further agrees that it shall protect, reimburse and indemnify County from and assume all liability for its tax and assessment obligations under the terms of the Agreement.

The County is exempt from payment of Florida state sales and use taxes. The Contractor shall not be exempted from paying sales tax to its suppliers for materials used to fulfill contractual obligations with the County, nor is the Contractor authorized to use the County's tax exemption number in securing such materials.

The Contractor shall be responsible for payment of its own and its share of its employees' payroll, payroll taxes, and benefits with respect to this Agreement.

ARTICLE 22. PROHIBITION AGAINST CONTRACTING WITH SCRUTINIZED COMPANIES.

Pursuant to Florida Statutes Section 215.4725, contracting with any entity that is listed on the Scrutinized Companies that Boycott Israel List or that is engaged in the boycott of Israel is prohibited. Contractors must certify that the company is not participating in a boycott of Israel. Any contract for goods or services of One Million Dollars ($1,000,000) or more shall be terminated at the County's option if it is discovered that the entity submitted false documents of certification, is listed on the Scrutinized Companies with Activities in Sudan List, the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, or has been engaged in business operations in Cuba or Syria after July 1, 2018.

Any contract entered into or renewed after July 1, 2018 shall be terminated at the County's option if the company is listed on the Scrutinized Companies that Boycott Israel List or engaged in the boycott of Israel. Contractors must submit the certification that is attached to this agreement as Attachment "D". Submitting a false certification shall be deemed a material breach of contract. The County shall provide notice, in writing, to the Contractor of the County's determination concerning the false certification. The Contractor shall have ninety (90) days following receipt of the notice to respond in writing and demonstrate that the determination was in error. If the Contractor does not demonstrate that the County's determination of false certification was made in error, then the County shall have the right to terminate the contract and seek civil remedies pursuant to Florida Statute Section 215.4725.

ARTICLE 23. INCONSISTENCIES AND ENTIRE AGREEMENT.

If there is a conflict or inconsistency between any term, statement, requirement, or provision of any attachment attached hereto, any document or events referred to herein, or any document incorporated into this Agreement, the term, statement, requirement, or provision contained in this Agreement shall prevail and be given superior effect and priority over any conflicting or inconsistent term, statement, requirement or provision contained in any other document or attachment, including but not limited to Attachments listed in Section 1.

ARTICLE 24. SEVERABILITY.

If any term or condition of this Contract shall be deemed, by a court having appropriate jurisdiction, invalid or unenforceable, the remainder of the terms and conditions of this Contract shall remain in full force and effect. This Contract shall not be more strictly construed against either party hereto by reason of the fact that one party may have drafted or prepared any or all the terms and provisions hereof.

ARTICLE 25. ENTIRE AGREEMENT.

This Agreement and Exhibits _____ contains the entire agreement of the parties, and may be amended, waived, changed, modified, extended or rescinded only by in writing signed by the party against whom any such amendment, waiver, change, modification, extension and/or rescission is sought.

ARTICLE 26. REPRESENTATION OF AUTHORITY TO CONTRACTOR/SIGNATORY.

The individual signing this Agreement on behalf of Contractor represents and warrants that he or she is duly authorized and has legal capacity to execute and deliver this Agreement. The signatory represents and warrants to the County that the execution and delivery of this Agreement and the performance of the Services and obligations hereunder have been duly authorized and that the Agreement is a valid and legal agreement binding on the Contractor and enforceable in accordance with its terms.

IN WITNESS WHEREOF, Owner, and Contractor have signed this Agreement in triplicate. One counterpart each has been delivered to Owner, Contractor, and Engineer. All portions of the Contract Documents have been signed, initialed or identified by Owner, and Contractor, or identified by Engineer on their behalf.

This Agreement will be effective on _____, 20___ (which is the Effective Date of the Agreement).

OWNER	**CONTRACTOR**
Okaloosa County, Florida ,	_____
By: _____,	By: _____
Carolyn N. Ketchel Chairman, Board of County Commissioners	
Signed: _____	Signed: _____

[CORPORATE SEAL}	[CORPORATE SEAL]
Attest _____	Attest _____
Signed: _____	Signed: _____
Address for giving notices _____ _____	Address for giving notices _____ _____
(If Owner is a public body, attached evidence of authority to sign and resolution or other documents authorizing execution of Agreement).	License No. _____ Agent for services of process: _____ _____ If Contractor is a corporation, attach evidence of authority to sign

Special Conditions
Federal Requirements
With EEO and Davis – Bacon Act

The following special conditions apply to the Agreement and are incorporated herein by reference:

Clean Air Act (42 U.S.C. 7401-7671q.) and Federal Water Pollution Control Act (33 U.S.C. 1251-1387) Contractor agrees to comply with all applicable standards, orders, and regulations issued pursuant to the Clean Air Act (42 USC § 740-7671q) and the Federal Water Pollution Control Act as amended (33 USC § 1251-1387). The Contractor agrees to report any violation to the Owner immediately upon discovery. The County assumes responsibility for notifying the Environmental Protection Agency (EPA) and the State of Florida Department of Transportation.

Contractor must include this requirement in all subcontracts that exceeds $150,000.

Byrd Anti Lobbying Amendment (31 U.S. C. 1352). The Certification regarding Lobbying executed by Contractor and attached as part of Attachment "A" to the Agreement is hereby acknowledged and made part of the Agreement by reference.

Work Hour and Safety Standards (40 U.S.C. 3701-3708). The Certification regarding Work Hours and Safety Standards executed by Contractor and attached as part of Attachment "A" to the Agreement is hereby acknowledged and made part of the Agreement by reference.

Equal Employment Opportunity (2 CFR Part 200, Appendix II(C); 41 CFR § 61-1.4; 41 CFR 61-4.3; Executive Order 11246). During the performance of this contract, the Contractor agrees as follows:

(1) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, sexual orientation, gender identify, or national origin. Such action shall include, but not be limited to, the following: employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff, or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.

(2) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive considerations for employment without regard to race, color, religion, sex, or national origin.

(3) The Contractor will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice to be provided advising the said labor union or workers' representatives of the Contractor's commitments under this section and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(4) The Contractor will comply with all provisions of Executive Order 11246 of September 24, 1965, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(5) The Contractor will furnish all information and reports required by Executive Order 11246 of September 24, 1965, and by rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to his books, records, and accounts by the administering agency and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(6) In the event of the Contractor's noncompliance with the nondiscrimination clauses of this contract or with any of the said rules, regulations, or orders, this contract may be canceled, terminated, or suspended in whole or in part and the Contractor may be declared ineligible for further Government contracts or federally assisted construction contracts in accordance with procedures authorized in Executive Order 11246 of September 24, 1965, and such other sanctions may be imposed and remedies invoked as provided in Executive Order 11246 of September 24, 1965, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(7) The Contractor will include the portion of the sentence immediately preceding paragraph (1) and the provisions of paragraphs (1) through (7) in every subcontract or purchase order unless exempted by rules, regulations, or orders of the Secretary of Labor issued pursuant to section 204 of Executive Order 11246 of September 24, 1965, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as the administering agency may direct as a means of enforcing such provisions, including sanctions for noncompliance*: Provided, however*, that in the event a contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction by the administering agency the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

Standard Federal Equal Employment Opportunity Construction Contract Specifications:

1. As used in these specifications:

   a. "Covered area" means the geographical area described in the solicitation from which this contract resulted;

   b. "Director" means Director, Office of Federal Contract Compliance Programs (OFCCP), U.S. Department of Labor, or any person to whom the Director delegates authority;

   c. "Employer identification number" means the Federal social security number used on the Employer's Quarterly Federal Tax Return, U.S. Treasury Department Form 941;

   d. "Minority" includes:

      (1) Black (all persons having origins in any of the Black African racial groups not of Hispanic origin);

      (2) Hispanic (all persons of Mexican, Puerto Rican, Cuban, Central or South American, or other Spanish culture or origin regardless of race);

      (3) Asian and Pacific Islander (all persons having origins in any of the original peoples of the Far East, Southeast Asia, the Indian Subcontinent, or the Pacific Islands); and

      (4) American Indian or Alaskan native (all persons having origins in any of the original peoples of North America and maintaining identifiable tribal affiliations through membership and participation or community identification).

2. Whenever the Contractor, or any subcontractor at any tier, subcontracts a portion of the work involving any construction trade, it shall physically include in each subcontract in excess of $10,000 the provisions of these specifications and the Notice which contains the applicable goals for minority and female participation and which is set forth in the solicitations from which this contract resulted.

3. If the Contractor is participating (pursuant to 41 CFR part 60-4.5) in a Hometown Plan approved by the U.S. Department of Labor in the covered area either individually or through an association, its affirmative action obligations on all work in the Plan area (including goals and timetables) shall be in accordance with that Plan for those trades which have unions participating in the Plan. Contractors shall be able to demonstrate their participation in and compliance with the provisions of any such Hometown Plan. Each contractor or subcontractor participating in an approved plan is individually required to comply with its obligations under the EEO clause and to make a good faith effort to achieve each goal under the Plan in each trade in which it has employees. The overall good faith performance by other contractors or subcontractors toward a goal in an approved Plan does not excuse any covered contractor's or subcontractor's failure to take good faith efforts to achieve the Plan goals and timetables.

4. The Contractor shall implement the specific affirmative action standards provided in paragraphs 7a through 7p of these specifications. The goals set forth in the solicitation from which this contract resulted are expressed as percentages of the total hours of employment and training of minority and female utilization the Contractor should reasonably be able to achieve in each construction trade in which it has employees in the covered area. Covered construction contractors performing construction work in a geographical area where they do not have a Federal or federally assisted construction contract shall apply the minority and female goals established for the geographical area where the work is being performed. Goals are published periodically in the Federal Register in notice form, and such notices may be obtained from any Office of Federal Contract Compliance Programs office or from Federal procurement contracting officers. The Contractor is expected to make substantially uniform progress in meeting its goals in each craft during the period specified.

5. Neither the provisions of any collective bargaining agreement nor the failure by a union with whom the Contractor has a collective bargaining agreement to refer either minorities or women shall excuse the Contractor's obligations under these specifications, Executive Order 11246, or the regulations promulgated pursuant thereto.

6. In order for the non-working training hours of apprentices and trainees to be counted in meeting the goals, such apprentices and trainees shall be employed by the Contractor during the training period and the Contractor shall have made a commitment to employ the apprentices and trainees at the completion of their training, subject to the availability of employment opportunities. Trainees shall be trained pursuant to training programs approved by the U.S. Department of Labor.

7. The Contractor shall take specific affirmative actions to ensure equal employment opportunity. The evaluation of the Contractor's compliance with these specifications shall be based upon its effort to achieve maximum results from its actions. The Contractor shall document these efforts fully and shall implement affirmative action steps at least as extensive as the following:

a. Ensure and maintain a working environment free of harassment, intimidation, and coercion at all sites, and in all facilities at which the Contractor's employees are assigned to work. The Contractor, where possible, will assign two or more women to each

construction project. The Contractor shall specifically ensure that all foremen, superintendents, and other onsite supervisory personnel are aware of and carry out the Contractor's obligation to maintain such a working environment, with specific attention to minority or female individuals working at such sites or in such facilities.

b. Establish and maintain a current list of minority and female recruitment sources, provide written notification to minority and female recruitment sources and to community organizations when the Contractor or its unions have employment opportunities available, and maintain a record of the organizations' responses.

c. Maintain a current file of the names, addresses, and telephone numbers of each minority and female off-the-street applicant and minority or female referral from a union, a recruitment source, or community organization and of what action was taken with respect to each such individual. If such individual was sent to the union hiring hall for referral and was not referred back to the Contractor by the union or, if referred, not employed by the Contractor, this shall be documented in the file with the reason therefore along with whatever additional actions the Contractor may have taken.

d. Provide immediate written notification to the Director when the union or unions with which the Contractor has a collective bargaining agreement has not referred to the Contractor a minority person or female sent by the Contractor, or when the Contractor has other information that the union referral process has impeded the Contractor's efforts to meet its obligations.

e. Develop on-the-job training opportunities and/or participate in training programs for the area which expressly include minorities and women, including upgrading programs and apprenticeship and trainee programs relevant to the Contractor's employment needs, especially those programs funded or approved by the Department of Labor. The Contractor shall provide notice of these programs to the sources compiled under 7b above.

f. Disseminate the Contractor's EEO policy by providing notice of the policy to unions and training programs and requesting their cooperation in assisting the Contractor in meeting its EEO obligations; by including it in any policy manual and collective bargaining agreement; by publicizing it in the company newspaper, annual report, etc.; by specific review of the policy with all management personnel and with all minority and female employees at least once a year; and by posting the company EEO policy on bulletin boards accessible to all employees at each location where construction work is performed.

g. Review, at least annually, the company's EEO policy and affirmative action obligations under these specifications with all employees having any responsibility for hiring, assignment, layoff, termination, or other employment decisions, including specific review of these items, with onsite supervisory personnel such superintendents, general foremen, etc., prior to the initiation of construction work at any job site. A written record shall be made and maintained identifying the time and place of these meetings, persons attending, subject matter discussed, and disposition of the subject matter.

h. Disseminate the Contractor's EEO policy externally by including it in any advertising in the news media, specifically including minority and female news media, and providing written notification to and discussing the Contractor's EEO policy with other contractors and subcontractors with whom the Contractor does or anticipates doing business.

i. Direct its recruitment efforts, both oral and written, to minority, female, and community organizations, to schools with minority and female students; and to minority and female

recruitment and training organizations serving the Contractor's recruitment area and employment needs. Not later than one month prior to the date for the acceptance of applications for apprenticeship or other training by any recruitment source, the Contractor shall send written notification to organizations, such as the above, describing the openings, screening procedures, and tests to be used in the selection process.

j. Encourage present minority and female employees to recruit other minority persons and women and, where reasonable, provide after school, summer, and vacation employment to minority and female youth both on the site and in other areas of a contractor's workforce.

k. Validate all tests and other selection requirements where there is an obligation to do so under 41 CFR part 60-3.

l. Conduct, at least annually, an inventory and evaluation at least of all minority and female personnel, for promotional opportunities and encourage these employees to seek or to prepare for, through appropriate training, etc., such opportunities.

m. Ensure that seniority practices, job classifications, work assignments, and other personnel practices do not have a discriminatory effect by continually monitoring all personnel and employment related activities to ensure that the EEO policy and the Contractor's obligations under these specifications are being carried out.

n. Ensure that all facilities and company activities are non-segregated except that separate or single user toilet and necessary changing facilities shall be provided to assure privacy between the sexes.

o. Document and maintain a record of all solicitations of offers for subcontracts from minority and female construction contractors and suppliers, including circulation of solicitations to minority and female contractor associations and other business associations.

p. Conduct a review, at least annually, of all supervisor's adherence to and performance under the Contractor's EEO policies and affirmative action obligations.

8. Contractors are encouraged to participate in voluntary associations, which assist in fulfilling one or more of their affirmative action obligations (7a through 7p). The efforts of a contractor association, joint contractor union, contractor community, or other similar groups of which the Contractor is a member and participant may be asserted as fulfilling any one or more of its obligations under 7a through 7p of these specifications provided that the Contractor actively participates in the group, makes every effort to assure that the group has a positive impact on the employment of minorities and women in the industry, ensures that the concrete benefits of the program are reflected in the Contractor's minority and female workforce participation, makes a good faith effort to meet its individual goals and timetables, and can provide access to documentation which demonstrates the effectiveness of actions taken on behalf of the Contractor. The obligation to comply, however, is the Contractor's and failure of such a group to fulfill an obligation shall not be a defense for the Contractor's noncompliance.

9. A single goal for minorities and a separate single goal for women have been established. The Contractor, however, is required to provide equal employment opportunity and to take affirmative action for all minority groups, both male and female, and all women, both minority and non-minority. Consequently, if the particular group is employed in a substantially disparate manner (for example, even though the Contractor has achieved its goals for women generally), the Contractor may be in violation of the Executive Order if a specific minority group of women is underutilized.

10. The Contractor shall not use the goals and timetables or affirmative action standards to discriminate against any person because of race, color, religion, sex, or national origin.

11. The Contractor shall not enter into any subcontract with any person or firm debarred from Government contracts pursuant to Executive Order 11246.

12. The Contractor shall carry out such sanctions and penalties for violation of these specifications and of the Equal Opportunity Clause, including suspension, termination, and cancellation of existing subcontracts as may be imposed or ordered pursuant to Executive Order 11246, as amended, and its implementing regulations, by the Office of Federal Contract Compliance Programs. Any contractor who fails to carry out such sanctions and penalties shall be in violation of these specifications and Executive Order 11246, as amended.

13. The Contractor, in fulfilling its obligations under these specifications, shall implement specific affirmative action steps, at least as extensive as those standards prescribed in paragraph 7 of these specifications, so as to achieve maximum results from its efforts to ensure equal employment opportunity. If the Contractor fails to comply with the requirements of the Executive Order, the implementing regulations, or these specifications, the Director shall proceed in accordance with 41 CFR part 60-4.8.

14. The Contractor shall designate a responsible official to monitor all employment related activity to ensure that the company EEO policy is being carried out, to submit reports relating to the provisions hereof as may be required by the Government, and to keep records. Records shall at least include for each employee, the name, address, telephone number, construction trade, union affiliation if any, employee identification number when assigned, social security number, race, sex, status (e.g., mechanic, apprentice, trainee, helper, or laborer), dates of changes in status, hours worked per week in the indicated trade, rate of pay, and locations at which the work was performed. Records shall be maintained in an easily understandable and retrievable form; however, to the degree that existing records satisfy this requirement, contractors shall not be required to maintain separate records.

15. Nothing herein provided shall be construed as a limitation upon the application of other laws which establish different standards of compliance or upon the application of requirements for the hiring of local or other area residents (e.g. those under the Public Works Employment Act of 1977 and the Community Development Block Grant Program).

Davis-Bacon Act (2 CFR Part 200; 29 CFR Part 5).

1. Minimum Wages.

(i) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalent thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics.

Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Davis-Bacon Act on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (1)(iv) of this section; also,

regular contributions made or costs incurred for more than a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such weekly period. Such laborers and mechanics shall be paid the appropriate wage rate and fringe benefits on the wage determination for the classification of work actually performed, without regard to skill, except as provided in 29 CFR Part 5.5(a)(4). Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein: *Provided* that the employer's payroll records accurately set forth the time spent in each classification in which work is performed. The wage determination (including any additional classification and wage rates conformed under (1)(ii) of this section) and the Davis-Bacon poster (WH-1321) shall be posted at all times by the Contractor and its subcontractors at the site of the work in a prominent and accessible place where it can easily be seen by the workers.

(ii)(A) The contracting officer shall require that any class of laborers or mechanics, including helpers, which is not listed in the wage determination and which is to be employed under the contract shall be classified in conformance with the wage determination. The contracting officer shall approve an additional classification and wage rate and fringe benefits therefore only when the following criteria have been met:

(1) The work to be performed by the classification requested is not performed by a classification in the wage determination;

(2) The classification is utilized in the area by the construction industry; and

(3) The proposed wage rate, including any bona fide fringe benefits, bears a reasonable relationship to the wage rates contained in the wage determination.

(B) If the Contractor and the laborers and mechanics to be employed in the classification (if known), or their representatives, and the contracting officer agree on the classification and wage rate (including the amount designated for fringe benefits where appropriate), a report of the action taken shall be sent by the contracting officer to the Administrator of the Wage and Hour Division, Employment Standards Administration, U.S. Department of Labor, Washington, DC 20210. The Administrator, or an authorized representative, will approve, modify, or disapprove every additional classification action within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(C) In the event the Contractor, the laborers, or mechanics to be employed in the classification, or their representatives, and the contracting officer do not agree on the proposed classification and wage rate (including the amount designated for fringe benefits where appropriate), the contracting officer shall refer the questions, including the views of all interested parties and the recommendation of the contracting officer, to the Administrator for determination. The Administrator, or an authorized representative, will issue a determination within 30 days of receipt and so advise the contracting officer or will notify the contracting officer within the 30-day period that additional time is necessary.

(D) The wage rate (including fringe benefits where appropriate) determined pursuant to subparagraphs (1)(ii) (B) or (C) of this paragraph, shall be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(iii) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the contractor shall either pay the benefit as stated in the wage determination or shall pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(iv) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs reasonably anticipated in providing bona fide fringe benefits under a plan or program: *Provided* that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Davis-Bacon Act have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

2. Withholding.

The State of Florida Department of Transportation or the County shall upon its own action or upon written request of an authorized representative of the Department of Labor withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same prime contractor, or any other federally-assisted contract subject to Davis-Bacon prevailing wage requirements, which is held by the same prime contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of work, all or part of the wages required by the contract, State of Florida Department of Transportation may, after written notice to the Contractor, County, Applicant, or Owner, take such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

3. Payrolls and Basic Records.

(i) Payrolls and basic records relating thereto shall be maintained by the Contractor during the course of the work and preserved for a period of three years thereafter for all laborers and mechanics working at the site of the work. Such records shall contain the name, address, and social security number of each such worker; his or her correct classification; hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 1(b)(2)(B) of the Davis-Bacon Act); daily and weekly number of hours worked; deductions made; and actual wages paid. Whenever the Secretary of Labor has found under 29 CFR 5.5(a)(1)(iv) that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in section 1(b)(2)(B) of the Davis-Bacon Act, the Contractor shall maintain records that show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and that show the costs anticipated or the actual costs incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs shall maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(ii)(A) The Contractor shall submit weekly for each week in which any contract work is performed a copy of all payrolls to the State of Florida Department of Transportation if the agency is a party

to the contract, but if the agency is not such a party, the Contractor will submit the payrolls to the applicant, County, or Owner, as the case may be, for transmission to the State of Florida Department of Transportation. The payrolls submitted shall set out accurately and completely all of the information required to be maintained under 29 CFR 5.5(a)(3)(i), except that full social security numbers and home addresses shall not be included on weekly transmittals. Instead the payrolls shall only need to include an individually identifying number for each employee (*e.g.* the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH–347 is available for this purpose from the Wage and Hour Division Web site at *www.dol.gov/whd/forms/wh347instr.htm* or its successor site. The prime contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors shall maintain the full social security number and current address of each covered worker and shall provide them upon request to the State of Florida Department of Transportation if the agency is a party to the contract, but if the agency is not such a party, the Contractor will submit them to the applicant, County, or Owner, as the case may be, for transmission to the State of Florida Department of Transportation, the Contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a prime contractor to require a subcontractor to provide addresses and social security numbers to the prime contractor for its own records, without weekly submission to the Countying government agency (or the applicant, County, or Owner).

(B) Each payroll submitted shall be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and shall certify the following:

(1) The payroll for the payroll period contains the information required to be provided under 29 CFR § 5.5(a)(3)(ii), the appropriate information is being maintained under 29 CFR § 5.5 (a)(3)(i), and that such information is correct and complete;

(2) Each laborer and mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in Regulations 29 CFR Part 3;

(3) Each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(C) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 shall satisfy the requirement for submission of the "Statement of Compliance" required by paragraph (3)(ii)(B) of this section.

(D) The falsification of any of the above certifications may subject the Contractor or subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 231 of Title 31 of the United States Code.

(iii) The Contractor or subcontractor shall make the records required under paragraph (3)(i) of this section available for inspection, copying, or transcription by authorized representatives of the County, State of Florida Department of Transportation, or the Department of Labor and shall permit such representatives to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit the required records or to make them available, the Federal agency may, after written notice to the Contractor, County, applicant, or Owner, take

such action as may be necessary to cause the suspension of any further payment, advance, or guarantee of funds. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

4. Apprentices and Trainees.

(i) Apprentices. Apprentices will be permitted to work at less than the predetermined rate for the work they performed when they are employed pursuant to and individually registered in a bona fide apprenticeship program registered with the U.S. Department of Labor, Employment and Training Administration, Bureau of Apprenticeship and Training, or with a State Apprenticeship Agency recognized by the Bureau, or if a person is employed in his or her first 90 days of probationary employment as an apprentice in such an apprenticeship program, who is not individually registered in the program, but who has been certified by the Bureau of Apprenticeship and Training or a State Apprenticeship Agency (where appropriate) to be eligible for probationary employment as an apprentice. The allowable ratio of apprentices to journeymen on the job site in any craft classification shall not be greater than the ratio permitted to the contractor as to the entire work force under the registered program. Any worker listed on a payroll at an apprentice wage rate, who is not registered or otherwise employed as stated above, shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any apprentice performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. Where a contractor is performing construction on a project in a locality other than that in which its program is registered, the ratios and wage rates (expressed in percentages of the journeyman's hourly rate) specified in the Contractor's or subcontractor's registered program shall be observed. Every apprentice must be paid at not less than the rate specified in the registered program for the apprentice's level of progress, expressed as a percentage of the journeymen hourly rate specified in the applicable wage determination. Apprentices shall be paid fringe benefits in accordance with the provisions of the apprenticeship program. If the apprenticeship program does not specify fringe benefits, apprentices must be paid the full amount of fringe benefits listed on the wage determination for the applicable classification. If the Administrator determines that a different practice prevails for the applicable apprentice classification, fringes shall be paid in accordance with that determination. In the event the Bureau of Apprenticeship and Training, or a State Apprenticeship Agency recognized by the Bureau, withdraws approval of an apprenticeship program, the Contractor will no longer be permitted to utilize apprentices at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(ii) Trainees. Except as provided in 29 CFR 5.16, trainees will not be permitted to work at less than the predetermined rate for the work performed unless they are employed pursuant to and individually registered in a program which has received prior approval, evidenced by formal certification by the U.S. Department of Labor, Employment and Training Administration. The ratio of trainees to journeymen on the job site shall not be greater than permitted under the plan approved by the Employment and Training Administration. Every trainee must be paid at not less than the rate specified in the approved program for the trainee's level of progress, expressed as a percentage of the journeyman hourly rate specified in the applicable wage determination. Trainees shall be paid fringe benefits in accordance with the provisions of the trainee program. If the trainee program does not mention fringe benefits, trainees shall be paid the full amount of fringe benefits listed on the wage determination unless the Administrator of the Wage and Hour Division determines that there is an apprenticeship program associated with the corresponding journeyman wage rate on the wage determination that provides for less than

full fringe benefits for apprentices. Any employee listed on the payroll at a trainee rate that is not registered and participating in a training plan approved by the Employment and Training Administration shall be paid not less than the applicable wage rate on the wage determination for the classification of work actually performed. In addition, any trainee performing work on the job site in excess of the ratio permitted under the registered program shall be paid not less than the applicable wage rate on the wage determination for the work actually performed. In the event the Employment and Training Administration withdraws approval of a training program, the Contractor will no longer be permitted to utilize trainees at less than the applicable predetermined rate for the work performed until an acceptable program is approved.

(iii) Equal Employment Opportunity. The utilization of apprentices, trainees, and journeymen under this part shall be in conformity with the equal employment opportunity requirements of Executive Order 11246, as amended, and 29 CFR Part 30.

5. Compliance with Copeland Act Requirements.

The Contractor shall comply with the requirements of 29 CFR Part 3, which are incorporated by reference in this contract.

6. Subcontracts.

The Contractor or subcontractor shall insert in any subcontracts the clauses contained in 29 CFR Part 5.5(a)(1) through (10) and such other clauses as the County or State of Florida Department of Transportation may by appropriate instructions require, and also a clause requiring the subcontractors to include these clauses in any lower tier subcontracts. The prime contractor shall be responsible for the compliance by any subcontractor or lower tier subcontractor with all the contract clauses in 29 CFR Part 5.5.

7. Contract Termination: Debarment.

A breach of the contract clauses in paragraph 1 through 10 of this section may be grounds for termination of the contract, and for debarment as a contractor and a subcontractor as provided in 29 CFR 5.12.

8. Compliance with Davis-Bacon and Related Act Requirements.

All rulings and interpretations of the Davis-Bacon and Related Acts contained in 29 CFR Parts 1, 3, and 5 are herein incorporated by reference in this contract.

9. Disputes Concerning Labor Standards.

Disputes arising out of the labor standards provisions of this contract shall not be subject to the general disputes clause of this contract. Such disputes shall be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Parts 5, 6, and 7. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

10. Certification of Eligibility.

(i) By entering into this contract, the Contractor certifies that neither it (nor he or she) nor any person or firm who has an interest in the Contractor's firm is a person or firm ineligible to be awarded Government contracts by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(ii) No part of this contract shall be subcontracted to any person or firm ineligible for award of a Government contract by virtue of section 3(a) of the Davis-Bacon Act or 29 CFR 5.12(a)(1).

(iii) The penalty for making false statements is prescribed in the U.S. Criminal Code, 18 USC 1001.

Attachment "C"

Title VI List of Pertinent Nondiscrimination Acts and Authorities

During the performance of this Agreement, the Contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "Contractor"), as applicable, agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

- Title VI of the Civil Rights Act of 1964 (42 USC § 2000d *et seq*., 78 stat. 252) (prohibits discrimination on the basis of race, color, national origin);
- 49 CFR part 21 (Non-discrimination in Federally-assisted programs of the Department of Transportation—Effectuation of Title VI of the Civil Rights Act of 1964);
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 USC § 4601) (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Section 504 of the Rehabilitation Act of 1973 (29 USC § 794 *et seq*.), as amended (prohibits discrimination on the basis of disability); and 49 CFR part 27;
- The Age Discrimination Act of 1975, as amended (42 USC § 6101 *et seq*.) (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982 (49 USC § 471, Section 47123), as amended (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987 (PL 100-209) (broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, the Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act of 1990, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 USC §§ 12131 – 12189) as implemented by U.S. Department of Transportation regulations at 49 CFR parts 37 and 38;
- The Federal Aviation Administration's Nondiscrimination statute (49 USC § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures nondiscrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 USC 1681 et seq).

Draft Contract
Please note: this contract is a draft for contractor to view and understand the County's standard terms and conditions, it is subject to revisions. By submitting a bid/proposal contractor/contractor understands and acknowledges that the draft contract is not an offer. Contractors/contractors are not to sign this draft contract.

REMAINDER OF PAGE INTENTIONALLY LEFT BLANK

PERFOMANCE BOND

KNOW ALL MEN by these presents; That we (1)_____

_____ a (2)_____

hereinafter called "Principal" and (3)_____

of_____, State of _____, hereinafter called the

"Surety", are held and firmly bound unto (4)_____

of _____, hereinafter called "OWNER", in the penal sum

of _____dollars ($_____)

in lawful money of the United States for the payment of which sum well and truly to be made, we bind

ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these

presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain

contract with the Owner, dated the __ day of _____, 20__, a copy of which is

hereto

attached and make a part hereof for the construction of:

CONSTRUCTION OF SATELLITE CONCOURSE 'C' AT VPS AIRPORT

NOW, THEREFORE, if the Principal shall well, truly and faithfully perform its duties, all the undertakings, covenants, terms, conditions, and agreements of said contract during the original term thereof, and any extensions thereof which may be granted by the Owner, with or without notice to the Surety, and if he shall satisfy all claims and demands incurred under such contract, and shall fully indemnify and save harmless the Owner from all costs and damages which it may suffer by reason of failure to do so, and shall reimburse and repay the Owner all outlay and expense which the Owner may incur in making good any default, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be performed thereunder or the Specifications accompanying the same shall in any way affect its obligations on this bond, and it does not hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the work or to the Specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in six (6) counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20__.

ATTEST: _____

_____ Principal

_____ By: _____

(Principal) Secretary

_____ _____

Witness as to Surety

_____ _____

Address Address

SEAL:

ATTEST: _____

_____ Surety

_____

(Surety) Secretary

_____

Attorney-in-Fact

_____ _____

Witness as to Surety

_____ _____

Address Address

SEAL:

Date of bond must not be prior to date of Contract

1. Correct name of Contractor.
2. A Corporation, A Partnership or an Individual as case may be.
3. Correct name of Surety.
4. Correct name of Owner.
5. If Contractor is Partnership, all partners should execute bond.

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PAYMENT BOND

KNOW ALL MEN by these presents; That we (1)_____

_____ a (2)_____

hereinafter called "Principal" and (3)_____

of_____, State of _____, hereinafter call the

"Surety", are held and firmly bound unto (4)_____

of ____State of Florida_____, hereinafter called "OWNER", in the penal sum of _

_____dollars ($_____) in

lawful money of the United States for the payment of which sum well and truly to be made, we bind ourselves, our heirs, executors, administrators and successors, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION is such that Whereas, the Principal entered into a certain contract with the Owner, dated the __ day of _____, 20__, a copy of which is hereto attached and make a part hereof for the construction of:

CONSTRUCTION OF SATELLITE CONCOURSE 'C' AT VPS AIRPORT

NOW, THEREFORE, if the Principal shall promptly make payments to all persons, firms, subcontractors, and corporations furnishing materials for or performing labor in the prosecution of the work provided for in such contract, and any authorized extension or modification thereof, including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery, equipment and tools, consumed or used in connection with the construction of such work, and all insurance premiums on said work, and for all labor, performed in such work, whether by subcontractor or otherwise, then this obligation shall be void; otherwise to remain in full force and effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to the work to be in any wise affect its obligation on this bond, and it does hereby waive notice of any such changes, extension of time, alteration or addition to the terms of the contractor or to the work or to the Specifications.

PROVIDED, FURTHER, that no final settlement between the Owner and the Contractor shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

IN WITNESS WHEREOF, this instrument is executed in six (6) counterparts, each one of which shall be deemed an original, this the _____ day of _____, 20__.

ATTEST: _____

_____ Principal

_____ By: _____

(Principal) Secretary

_____ _____

Witness as to Surety

_____ _____

Address Address

SEAL:

ATTEST: _____

Surety

_____

(Surety) Secretary

_____

Attorney-in-Fact

_____ _____

Witness as to Surety

_____ _____

Address Address

SEAL:

CONTRACTOR'S RELEASE OF LIENS

STATE OF: _____

COUNTY OF: _____

Before me, the undersigned Notary Public in and for the said County and State personally appeared _____, representing the Contractor _____, who being duly sworn according to law deposes and says that all labor, materials, and outstanding claims and indebtedness of whatever nature arising out of the performance of the Contract with _____ _____, the Owner, for _____ , Contract No. , have been paid in full and that for the final payment in the amount of $ _____, the Contractor releases and discharges the Owner and his authorized representatives from any liens or claims or any nature because of or arising from this Contract and/or its performance, which it has had, has or may have in the future.

By: _____

Sworn to and subscribed before me this

_____ day of _____

_____
(Notary Public)

My Commission Expires: _____

ADVERTISEMENT OF COMPLETION

_____ (Contractor)

_____ (Address)

gives notice of completion of _____ (Project)

and sets _____ as the date of final settlement.

All persons and firms should file all claims for payment to the below address prior to the settlement date:

Okaloosa County
5479A Old Bethel Road
Crestview, FL 32536

By: _____ (Name)

_____ (Title)

Leg:_____ (Publication Dates)

Standard Additional Contract Clauses

Title VI Clauses for Compliance with Nondiscrimination Requirements

Compliance with Nondiscrimination Requirements

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

2. **Compliance with Regulations:** The contractor (hereinafter includes consultants) will comply with the Title VI List of Pertinent Nondiscrimination Acts And Authorities, as they may be amended from time to time, which are herein incorporated by reference and made a part of this contract.

3. **Non-discrimination:** The contractor, with regard to the work performed by it during the contract, will not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment. The contractor will not participate directly or indirectly in the discrimination prohibited by the Nondiscrimination Acts and Authorities, including employment practices when the contract covers any activity, project, or program set forth in Appendix B of 49 CFR part 21.

4. **Solicitations for Subcontracts, Including Procurements of Materials and Equipment:** In all solicitations, either by competitive bidding, or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials, or leases of equipment, each potential subcontractor or supplier will be notified by the contractor of the contractor's obligations under this contract and the Nondiscrimination Acts And Authorities on the grounds of race, color, or national origin.

5. **Information and Reports:** The contractor will provide all information and reports required by the Acts, the Regulations, and directives issued pursuant thereto and will permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the sponsor or the Federal Aviation Administration to be pertinent to ascertain compliance with such Nondiscrimination Acts And Authorities and instructions. Where any information required of a contractor is in the exclusive possession of another who fails or refuses to furnish the information, the contractor will so certify to the sponsor or the Federal Aviation Administration, as appropriate, and will set forth what efforts it has made to obtain the information.

6. **Sanctions for Noncompliance:** In the event of a contractor's noncompliance with the Non-discrimination provisions of this contract, the sponsor will impose such contract sanctions as it or the Federal Aviation Administration may determine to be appropriate, including, but not limited to:

a. Withholding payments to the contractor under the contract until the contractor complies; and/or

b. Cancelling, terminating, or suspending a contract, in whole or in part.

7. **Incorporation of Provisions:** The contractor will include the provisions of paragraphs one through six in every subcontract, including procurements of materials and leases of equipment, unless exempt by the Acts, the Regulations and directives issued pursuant thereto. The contractor will take action with respect to any subcontract or procurement as the sponsor or the Federal Aviation Administration may direct as a means of enforcing such provisions including sanctions for noncompliance. Provided, that if the contractor becomes involved in, or is threatened with litigation by a subcontractor, or supplier because of such direction, the contractor may request the sponsor to enter into any litigation to protect the interests of the sponsor. In addition, the contractor may request the United States to enter into the litigation to protect the interests of the United States.

Title VI List of Pertinent Nondiscrimination Acts and Authorities

Title VI List of Pertinent Nondiscrimination Acts and Authorities

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees to comply with the following non-discrimination statutes and authorities; including but not limited to:

- Title VI of the Civil Rights Act of 1964 (42 U.S.C. § 2000d *et seq*., 78 stat. 252), (prohibits discrimination on the basis of race, color, national origin);
- 49 CFR part 21 (Non-discrimination In Federally-Assisted Programs of The Department of Transportation—Effectuation of Title VI of The Civil Rights Act of 1964);
- The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, (42 U.S.C. § 4601), (prohibits unfair treatment of persons displaced or whose property has been acquired because of Federal or Federal-aid programs and projects);
- Section 504 of the Rehabilitation Act of 1973, (29 U.S.C. § 794 *et seq*.), as amended, (prohibits discrimination on the basis of disability); and 49 CFR part 27;
- The Age Discrimination Act of 1975, as amended, (42 U.S.C. § 6101 *et seq*.), (prohibits discrimination on the basis of age);
- Airport and Airway Improvement Act of 1982, (49 USC § 471, Section 47123), as amended, (prohibits discrimination based on race, creed, color, national origin, or sex);
- The Civil Rights Restoration Act of 1987, (PL 100-209), (Broadened the scope, coverage and applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975 and Section 504 of the Rehabilitation Act of 1973, by expanding the definition of the terms "programs or activities" to include all of the programs or activities of the Federal-aid recipients, sub-recipients and contractors, whether such programs or activities are Federally funded or not);
- Titles II and III of the Americans with Disabilities Act of 1990, which prohibit discrimination on the basis of disability in the operation of public entities, public and private transportation systems, places of public accommodation, and certain testing entities (42 U.S.C. §§ 12131 – 12189) as implemented by Department of Transportation regulations at 49 CFR parts 37 and 38;

- The Federal Aviation Administration's Non-discrimination statute (49 U.S.C. § 47123) (prohibits discrimination on the basis of race, color, national origin, and sex);
- Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, which ensures non-discrimination against minority populations by discouraging programs, policies, and activities with disproportionately high and adverse human health or environmental effects on minority and low-income populations;
- Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency, and resulting agency guidance, national origin discrimination includes discrimination because of limited English proficiency (LEP). To ensure compliance with Title VI, you must take reasonable steps to ensure that LEP persons have meaningful access to your programs (70 Fed. Reg. at 74087 to 74100);
- Title IX of the Education Amendments of 1972, as amended, which prohibits you from discriminating because of sex in education programs or activities (20 U.S.C. 1681 et seq).

FEDERAL FAIR LABOR STANDARDS ACT (FEDERAL MINIMUM WAGE)

All contracts and subcontracts that result from this solicitation incorporate by reference the provisions of 29 CFR part 201, the Federal Fair Labor Standards Act (FLSA), with the same force and effect as if given in full text. The FLSA sets minimum wage, overtime pay, recordkeeping, and child labor standards for full and part time workers.

The [*contractor* | *consultant*] has full responsibility to monitor compliance to the referenced statute or regulation. The [*contractor* | *consultant*] must address any claims or disputes that arise from this requirement directly with the U.S. Department of Labor – Wage and Hour Division

OCCUPATIONAL SAFETY AND HEALTH ACT OF 1970

All contracts and subcontracts that result from this solicitation incorporate by reference the requirements of 29 CFR Part 1910 with the same force and effect as if given in full text. Contractor must provide a work environment that is free from recognized hazards that may cause death or serious physical harm to the employee. The Contractor retains full responsibility to monitor its compliance and their subcontractor's compliance with the applicable requirements of the Occupational Safety and Health Act of 1970 (20 CFR Part 1910). Contractor must address any claims or disputes that pertain to a referenced requirement directly with the U.S. Department of Labor – Occupational Safety and Health Administration.

E-VERIFY

Enrollment and verification requirements.

(1) If the Contractor is not enrolled as a Federal Contractor in E-Verify at time of contract award, the Contractor shall-

a. Enroll. Enroll as a Federal Contractor in the E-Verify Program within thirty (30) calendar days of contract award;

b. Verify all new employees. Within ninety (90) calendar days of enrollment in the E-Verify program, begin to use E-Verify to initiate verification of employment eligibility of all new hires of the Contractor, who are working in the United States, whether or not assigned to the contract, within three (3) business days after the date of hire (but see paragraph (b)(3) of this section); and,

c. Verify employees assigned to the contract. For each employee assigned to the contract, initiate verification within ninety (90) calendar days after date of enrollment or within thirty (30) calendar days of the employee's assignment to the contract, whichever date is later (but see paragraph (b)(4) of this section.)

(2) If the Contractor is enrolled as a Federal Contractor in E-Verify at time of contract award, the Contractor shall use E-Verify to initiate verification of employment eligibility of

a. All new employees.

a. Enrolled ninety (90) calendar days or more. The Contractor shall initiate verification of all new hires of the Contractor, who are working in the United States, whether or not assigned to the contract, within three (3) business days after the date of hire (but see paragraph (b)(3) of this section); or

b. Enrolled less than ninety (90) calendar days. Within ninety (90) calendar days after enrollment as a Federal Contractor in E-Verify, the Contractor shall initiate verification of all new hires of the contractor, who are working in the United States, whether or not assigned to the contract, within three (3) business days after the date of hire (but see paragraph (b)(3) of this section; or

c. Employees assigned to the contract. For each employee assigned to the contract, the Contractor shall initiate verification within ninety (90) calendar days after date of contract award or within thirty (30) days after assignment to the contract, whichever date is later (but see paragraph (b)(4) of this section.)

(3) If the Contractor is an institution of higher education (as defined at 20 U.S.C. 1001(a)); a State of local government or the government of a Federally recognized Indian tribe, or a surety performing under a takeover agreement entered into with a Federal agency pursuant to a performance bond, the Contractor may choose to verify only employees assigned to the contract, whether existing employees or new hires. The Contractor shall follow the applicable verification requirements of (b)(1) or (b)(2), respectively, except that any requirement for verification of new employees applies only to new employees assigned to the contract.

(4) Option to verify employment eligibility of all employees. The Contractor may elect to verify all existing employees hired after November 6, 1986 (after November 27, 2009, in the Commonwealth of the Northern Mariana Islands), rather than just those employees assigned to the contract. The Contractor shall initiate verification for each existing employee working in the United States who was hired after November 6, 1986 (after November 27, 2009, in the Commonwealth of the Northern Mariana Islands), within one hundred eighty (180) calendar days of-

a. Enrollment in the E-Verify program; or

b. Notification to E-Verify Operations of the Contractor's decision to exercise this option, using the contract information provided in the E-Verify program Memorandum of Understanding (MOU)

(5) The Contractor shall comply, for the period of performance of this contract, with the requirements of the E-Verify program MOU.

a. The Department of Homeland Security (DHS) or the Social Security Administration (SSA) may terminate the Contractor's MOU and deny access to the E-Verify system in accordance with the terms of the MOU. In such case, the Contractor, will be referred to a suspension or debarment official.

b. During the period between termination of the MOU and a decision by the suspension or debarment official whether to suspend or debar, the contractor is excused from its obligations under paragraph (b) of this clause. If the suspension or debarment official determines not to suspend or debar the Contractor, then the Contractor must reenroll in E-Verify.

c. Web site. Information on registration for and use of the E-Verify program can be obtained via the Internet at the Department of Homeland Security Web site: http://www.dhs.gov/E-Verify.

d. Individuals previously verified. The Contractor is not required by this clause to perform additional employment verification using E-Verify for any employee

i. Whose employment eligibility was previously verified by the Contractor through the E-Verify program;

ii. Who has been granted and holds an active U.S. Government security clearance for access to confidential, secret, or top secret information in accordance with the National Industrial Security Program Operating Manual; or

iii. Who has undergone a completed background investigation and been issued credentials pursuant to Homeland Security Presidential Directive (HSPD)-12. Policy for a Common Identification Standard for Federal Employees and Contractors.

Subcontracts. The Contractor shall include the requirements of this clause, including this paragraph € (appropriately modified for identification of the parties in each subcontract that-

(1) Is for-

i. Commercial and noncommercial services (except for commercial services that are part of the purchase of a COTS item (or an item that would be a COTS item, but for minor modifications), performed by the COTS provider, and are normally provided for that COTS item); or

ii. Construction;

(2) Has a value of more than $3,500; and

(3) Includes work performed in the United States.

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GENERAL CONDITIONS

ARTICLE 1 – DEFINITIONS

Wherever used in these General Conditions or in the other Contract Documents the following terms have the meanings indicated which are applicable to both the singular and plural thereof:

1.1. AASHTO – The American Association of State Highway and Transportation Officials, the successor association AASHO.

1.2. Access Road – The right-of-way, the roadway and all improvements constructed thereon connecting the airport to a public highway.

1.3. Addenda – Written or graphic instruments issued prior to the opening of Bids which clarify, correct or change the Project Requirements or the Contract Documents.

1.4. Advertisement – A public announcement, as required by local law, inviting bids for work to be performed and materials to be furnished.

1.5. Agreement – The written contract between Owner and Contractor covering the Work to be performed; other Contract Documents are attached to the Agreement and made a part thereof as provided therein.

1.6. AIP – The Airport Improvement Program, a grant-in-aid program, administered by the Federal Aviation Administration.

1.7. Air Operations Area – For the purpose of these specifications, the term air operations area shall mean any area of the airport used or intended to be used for the landing, takeoff, or surface maneuvering of aircraft. An air operation area shall include such paved or unpaved areas that are used or intended to be used for the unobstructed movement of aircraft in addition to its associated runway, taxiway, or apron.

1.8 Airport – Airport means the area of land or water which is used or intended to be used for the landing and takeoff of aircraft, and includes its buildings and facilities, if any.

1.9. Application for Payment – The form accepted by Architect/Engineer which is to be used by Contractor in requesting progress or final payments and which is to be accompanied by such supporting documentation as is required by the Contract Documents.

1.10. Asbestos – Any material that contains more than one percent asbestos and is friable or is releasing asbestos fibers into the air above current action levels established by the United States Occupational Safety and Health Administration.

1.11. ASTM – The American Society for Testing and Materials.

1.12. Award – The acceptance, by the Owner, of the successful contractor's proposal.

1.13. Bid – The offer or proposal of the contractor submitted on the prescribed form setting forth the prices for the Work to be performed.

1.14. Contractor – Any individual, partnership, firm, or corporation, acting directly or through a duly authorized representative, who submits a proposal for the work contemplated.

1.15. Project Documents – The advertisement or invitation to Bid, instructions to contractors, the Bid Form, and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

1.16. Project Requirements – The advertisement or invitation to Bid, instructions to contractors, and the Bid Form.

1.17. Building Area – An area on the airport to be used, considered, or intended to be used for airport buildings, or other facilities or rights-of-way together with all airport buildings and facilities located thereon.

1.18. Bonds – Performance and Payment bonds and other instruments of security.

1.19. Calendar Day – Every day shown on the calendar.

1.20. Certificates of Compliance – Written statements by the manufacturer stating the material furnished is in conformance with the Specifications.

1.21. Change Order – A document recommended by Architect/Engineer, which is signed by Contractor and Owner and authorizes an addition, deletion or revision in the Work, or an adjustment in the Contract Price or the Contract Times, issued on or after the Effective Date of the Agreement. The work covered by a change order shall be within the scope of the contract.

1.22. Contract Documents – The Agreement, Addenda (which pertain to the Contract Documents), Contractor's Bid (including documentation accompanying the Bid and any post Bid documentation submitted prior to the Notice of Award) when attached as an exhibit to the Agreement, the Notice to Proceed, the Bonds, these General Conditions, the Supplementary Conditions, the Specifications and the Drawings as the same are more specifically identified in the Agreement, together with all Written Amendments, Change Orders, Work Change Directives, Field Orders and Architect/Engineer's written interpretations and clarifications issued pursuant to paragraphs 3.5, 3.6.1, and 3.6.3 on or after the Effective Date of the Agreement. Shop Drawing submittals approved pursuant to paragraphs 6.19 and 6.20 and the reports and drawings referred to in paragraphs 4.2.1.1 and 4.2.2.2 are not Contract Documents.

1.23. Contract Price – The money payable by Owner to Contractor for completion of the Work in accordance with the Contract Documents as stated in the Agreement (subject to the provisions of paragraph 11.9.1 in the case of Unit Price Work).

1.24. Contract Times – The numbers of days or the dates stated in the Agreement: (i) to achieve Substantial Completion, and (ii) to complete the Work so that it is ready for final payment as evidenced by Architect/Engineer's written recommendation of final payment in accordance with paragraph 14.13.

1.25. Contract Item (Pay Item) – A specific unit of work for which a price is provided in the Contract.

1.26. Contractor – The person, firm or corporation with whom Owner has entered into the Agreement.

1.27. Defective – An adjective which when modifying the word Work refers to Work that is unsatisfactory, faulty or deficient, in that it does not conform to the Contract Documents, or does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents, or has been damaged prior to Architect/Engineer's recommendation of final payment (unless responsibility for the protection thereof has been assumed by Owner at Substantial Completion in accordance with paragraph 14.8 or 14.10).

1.28. Drainage System – The system of pipes, ditches, and structures by which surface or subsurface waters are collected and conducted from the airport area.

1.29. Drawings – The drawings which show the scope, extent, and character of the Work to be furnished and performed by Contractor and which have been prepared or approved by Architect/Engineer and are referred to in the Contract Documents. Shop drawings are not Drawings as so defined.

1.30. Effective Date of the Agreement – The date indicated in the Agreement on which it becomes effective, but if no such date is indicated it means the date on which the Agreement is signed and delivered by the last of the two parties to sign and deliver.

1.31. Architect/Engineer – The person, firm, or corporation named as such in the Agreement.

1.32. Architect/Engineer's Consultant – A person, firm, or corporation having a contract with Architect/Engineer to furnish services as Architect/Engineer's independent professional associate or consultant with respect to the Project and who is identified as such in the Supplementary Conditions. The following list of independent professional associates and consultants are considered the Architect/Engineer's consultant for this Construction Contract: AVCON, Inc.

1.33. Equipment – All machinery, together with the necessary supplies for upkeep and maintenance, and also all tools and apparatus necessary for the proper construction and acceptable completion of the work.

1.34. Extra Work – An item of work not provided for in the awarded contract as previously modified by change order or supplemental agreement, but which if found by the Architect/Engineer to be necessary to complete the work within the intended scope of the contract as previously modified.

1.35. FAA – The Federal Aviation Administration of the U.S. Department of Transportation. When used to designate a person, FAA shall mean the Administrator or his duly authorized representative.

1.36. Federal Specifications – The Federal Specifications and Standards, and supplements, amendments, and indices thereto are prepared and issued by the General Services Administration of the Federal Government. They may be obtained from the Specifications Activity, Printed Materials Supply Division, Building 197, Naval Weapons Plant, Washington, D.C. 20407.

1.37. Field Order – A written order issued by Architect/Engineer which orders minor changes in the Work in accordance with paragraph 9.5 but which does not involve a change in the Contract Price or the Contract Times.

1.38. General Requirements – Sections of Division 1 of the Specifications.

1.39. Hazardous Waste – The term Hazardous Waste shall have the meaning provided in Section 1004 of the Solid Waste Disposal Act (42 USC Section 6903) as amended from time to time.

1.40. Inspector – An authorized representative of the Architect/Engineer assigned to make all necessary inspections and/or tests of the work performed or being performed, or of the materials furnished or being furnished by the Contractor.

1.41. Intention of Terms – Whenever, in these specifications or on the plans, the words, "directed," "required," "permitted," "ordered," "designated," "prescribed," or words of the like import are used, it shall be understood that the direction, requirement, permission, order, designation, or prescription of the Architect/Engineer is intended; and similarly, the words "approved," "acceptable," "Satisfactory," or words of like import, shall mean approved by, or acceptable to, or satisfactory to the Architect/Engineer, subject in each case to the final determination of the Owner.

1.42. Laboratory – The official testing laboratories of the Owner or such other laboratories as may be designated by the Architect/Engineer.

1.43. Laws and Regulations; Laws or Regulations – Any and all applicable laws, rules, regulations, ordinances, codes and orders of any and all governmental bodies, agencies, authorities and courts having jurisdiction.

1.44. Liens – Liens, charges, security interests, or encumbrances upon real property or personal property.

1.45. Lighting – A system of fixtures providing or controlling the light sources used on or near the airport or within the airport buildings. The field lighting includes all luminous signals, markers, floodlights, and illuminating devices used on or near the airport or to aid in the operation of aircraft landing at, taking off from, or taxiing on the airport surface.

1.46. Major and Minor Contract Items – A major contract item shall be any item that is listed in the proposal, the total cost of which is equal to or greater than 25 percent of the total amount of the award contract. All other items shall be considered minor contract items.

1.47. Materials – Any substance specified for use in the construction of the Contract work.

1.48. Mil Specifications – The Military Specifications and Standard, and indices thereto, that are prepared and issued by the Department of Defense.

1.49. Milestone – A principal event specified in the Contract Documents relating to an intermediate completion date or time prior to Substantial Completion of all the Work.

1.50. Notice of Award – The written notice by Owner to the apparent successful contractor stating that upon compliance by the apparent successful contractor with the conditions precedent enumerated therein, within the time specified, Owner will sign and deliver the Agreement.

1.51. Notice to Proceed – A written notice given by Owner to Contractor (with a copy to Architect/Engineer) fixing the date on which the Contract Times will commence to run and on which Contractor shall start to perform Contractor's obligations under the Contract Documents.

1.52. FDOT – The Florida State Department of Transportation. When used to designate a person, FDOT shall mean the commissioner or his duly authorized representative.

1.53. Owner – The public body or authority, corporation, association, firm, or person with whom Contractor has entered into the Agreement and for whom the Work is to be provided.

1.54. Partial Utilization – Use by Owner of a substantially completed part of the Work for the purpose for which it is intended (or a related purpose) prior to Substantial Completion of all the Work.

1.55. Pavement – The combined surface course, base course, and subbase course, if any, considered as a single unit.

1.56. Payment Bond – The approved form of security furnished by the Contractor and his/her surety as a guaranty that he will pay in full all bills and accounts for materials and labor used in the construction of the work.

1.57. PCBs – Polychlorinated biphenyls.

1.58. Performance Bond – The approved form of security furnished by the Contractor and his/her surety as a guaranty that the Contractor will complete the work in accordance with the terms of the contract.

1.59. Petroleum – Petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute), such as oil, petroleum, fuel oil, oil sludge, oil refuse, gasoline, kerosene, and oil mixed with other non-Hazardous Wastes and crude oils.

1.60. Plans – The official drawings or exact reproductions which show the location, character, dimensions, and details of the airport and the work to be done and which are to be considered as a part of the contract, supplementary to the specifications.

1.61. Project – The total construction of which the Work to be provided under the Contract Documents may be the whole, or a part as indicated elsewhere in the Contract Documents.

1.62. Proposal – (See Bid).

1.63. Radioactive Material – Source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954 (42 USC Section 2011 et seq.) as amended from time to time.

1.64. Resident Project Representative - The authorized representative of Architect/Engineer who may be assigned to the site or any part thereof.

1.65. Runway – The area on the airport prepared for the landing and takeoff of aircraft.

1.66. Samples – Physical examples of materials, equipment, or workmanship that are representative of some portion of the Work and which establish the standards by which such portion of the Work will be judged.

1.67. Shop Drawings – All drawings, diagrams, illustrations, schedules, and other data or information which are specifically prepared or assembled by or for Contractor and submitted by Contractor to illustrate some portion of the Work.

1.68. Special Provisions – The specific clauses setting forth conditions or requirements peculiar to the project under consideration, covering work or materials involved in the proposal and estimate, which are not thoroughly or satisfactorily stipulated in these specifications.

1.69. Specifications – Those portions of the Contract Documents consisting of written technical descriptions of materials, equipment, construction systems, standards, and workmanship as applied to the Work and certain administrative details applicable thereto.

1.70. Sponsor – For AIP Contracts, the term Sponsor shall have the meaning as the term Owner.

1.71. Structures – Airport facilities such as bridges; culverts; catch basins; inlets; retaining walls; cribbing; storm and sanitary sewer lines; water lines; underdrains; electrical ducts, manholes, handholes, lighting fixtures and bases; transformers; flexible and rigid pavements; navigational aids; buildings; vaults; and, other manmade features of the airport that may be encountered in the work and not otherwise classified herein.

1.72. Subcontractor – An individual, firm, or corporation having a direct contract with Contractor or with any other Subcontractor for performance of a part of the Work at the site.

1.73. Subgrade – The soil which forms the pavement foundation.

1.74. Superintendent – The Contractor's executive representative who is present on the work during progress, authorized to receive and fulfill instruction from the Architect/Engineer, and who shall supervise and direct the construction.

1.75. Substantial Completion – The Work (or a specified part thereof) has progressed to the point where, in the opinion of Architect/Engineer as evidenced by Architect/Engineer's definitive certificate of Substantial Completion, it is sufficiently complete, in accordance with the Contract Documents, so that the Work (or specified part) can be utilized for the purposes for which it is intended; or if no such certificate is issued, when the Work is complete and ready for final payment as evidenced by Architect/Engineer's written recommendation of final payment in accordance with paragraph 14.13. The terms "substantially complete" and "substantially completed" as applied to all or part of the Work refer to Substantial Completion thereof.

1.76. Supplemental Agreement – A written agreement between the Contractor and the Owner covering: (1) work that would increase or decrease the total amount of the awarded contract, or any major contract item, by more than 25 percent, such increased or decreased work being within

the scope of the originally awarded contract; or (2) work that is not within the scope of the originally awarded contract.

1.77. Supplementary Conditions – The part of the Contract Documents which amends or supplements these General Conditions.

1.78. Supplier – A manufacturer, fabricator, supplier, distributor, materialman, or vendor having direct contract with Contractor or with any Subcontractor to furnish materials or equipment to be incorporated in the Work by Contractor or any Subcontractor.

1.79. Surety – The corporation, partnership, or individual, other than the Contractor, executing payment or performance bonds which are furnished to the Owner by the Contractor.

1.80. Taxiway – For the purpose of this document, the term taxiway means the portion of the air operations area of an airport that has been designated by competent airport authority for movement of aircraft to and from the airport's runways or aircraft parking areas.

1.81. Underground Facilities – All pipelines, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels, or other such facilities or attachments, and any encasements containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone, or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

1.82. Unit Price Work – Work to be paid for on the basis of unit prices.

1.83. Work – The entire completed construction or the various separately identifiable parts thereof required to be furnished under the Contract Documents. Work includes and is the result of performing or furnishing labor and furnishings and incorporating materials and equipment into the construction, and performing or furnishing services and furnishing documents, all as required by the Contract Documents.

1.84 Work Change Directive - A written directive to Contractor, issued on or after the Effective Date of the Agreement and signed by Owner and recommended by Architect/Engineer, ordering an addition, deletion, or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed as provided in paragraph 4.2 or 4.3 or to emergencies under paragraph 6.18. A Work Change Directive will not change the Contract Price or the Contract Times, but is evidence that the parties expect that the change directed or documented by a Work Change Directive will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Price or Contract Times as provided in Article 10.

1.85. Working Day – A working day shall be any day other than a legal holiday, Saturday, or Sunday on which the normal working forces of the Contractor may proceed with regular work for at least 6 hours toward completion of the Contract. Unless work is suspended for causes beyond the Contractor's control, Saturdays, Sundays and holidays on which the Contractor's forces engage in regular work, requiring the presence of an inspector, will be considered as working days.

1.86. Work Period – A work period shall consist of any designated block of time on which the normal working forces of the Contractor may proceed with regular work for at least 5 hours toward completion of the contract. Unless work is suspended for causes beyond the Contractor's control, work occurring on any day, regardless of it being a weekend or holiday, which requires an Inspector, will be considered a work period. Work periods are limited to between 7:00 a.m. and 5:00 p.m. local time Monday through Friday. Weekend work will not be permitted unless contractor obtains written permission from Owner.

1.87. Written Amendment – A written amendment of the Contract Documents, signed by Owner and Contractor on or after the Effective Date of the Agreement and normally dealing with the non-Architect/Engineering or nontechnical rather than strictly construction-related aspects of the Contract Documents.

ARTICLE 2 – PRELIMINARY MATTERS

Delivery of Bonds:
2.1. When Contractor delivers the executed Agreements to Owner, Contractor shall also deliver to Owner such Bonds as Contractor may be required to furnish in accordance with paragraph 5.1.

Copies of Documents:
2.2. Owner shall furnish to Contractor up to five copies (unless otherwise specified in the Supplementary Conditions) of the Contract Documents as are reasonably necessary for the execution of the Work. Additional copies will be furnished, upon request, at the cost of reproduction.

Commencement of Contract Times; Notice to Proceed:
2.3. The Contract Times will commence to run on the thirtieth day after the Effective Date of the Agreement, or, if a Notice to Proceed is given, on the day indicated in the Notice to Proceed. A Notice to Proceed may be given at any time within thirty days after the Effective Date of the Agreement. In no event will the Contract Time commence to run later than the *one hundred twentieth (120th)* day after the day of Bid opening or the *ninetieth (90th)* day after the Effective Date of the Agreement, whichever date is earlier.

Starting the Work:
2.4. Contractor shall start to perform the Work on the date when the Contract Times commence to run, but no Work shall be done at the site prior to the date on which the Contract Times commence to run.

Before Starting Construction:
2.5. Before undertaking each part of the Work, Contractor shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements. Contractor shall promptly report in writing to Architect/Engineer any conflict, error, ambiguity or discrepancy which Contractor may discover and shall obtain a written interpretation or clarification from Architect/Engineer before proceeding with any Work affected thereby; however, Contractor shall not be liable to Owner or Architect/Engineer for failure to report any conflict, error, ambiguity or discrepancy in the Contract Documents, unless Contractor knew or reasonably should have known thereof.

2.6. Within ten days after the Construction Notice to Proceed contractor shall submit to Architect/Engineer for review:

2.6.1. a preliminary progress schedule indicating the times (numbers of days or dates) for starting and completing the various stages of the Work, including any Milestones specified in the Contract Documents;

2.6.2. a preliminary schedule of Shop Drawings and Sample submittals which will list each required submittal and the times for submitting, reviewing and processing such submittal;

2.6.3. a preliminary schedule of values for all of the Work which will include quantities and prices of items aggregating the Contract Price and will subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction. Such prices will include and appropriate amount of overhead and profit applicable to each item of Work.

2.7. Before any Work at the site is started, Contractor and Owner shall each deliver to the other, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance which either of them or any additional insured may reasonably request) which Contractor and Owner respectively are required to purchase and maintain in accordance with paragraphs 5.4 and 5.6.

Preconstruction Conference:
2.8. Within twenty *(20)* days *prior to Construction Notice to Proceed*, but before any Work at the site is started, a conference attended by Contractor, Architect/Engineer and others as appropriate will be held to establish a working understanding among the parties as to the Work and to discuss the schedules referred to in paragraph 2.6, procedures for handling Shop Drawings, and other submittals, processing Applications for Payment and maintaining required records.

Initially Acceptable Schedules:
2.9. Unless otherwise provided in the Contract Documents, at least ten days before submission of the first Application for Payment a conference attended by Contractor, Architect/Engineer, and others as appropriate will be held to review for acceptability to Architect/Engineer as provided below the schedules submitted in accordance with paragraph 2.6. Contractor shall have an additional ten days to make corrections and adjustments and to complete and resubmit the schedules. No progress payment shall be made to Contractor until the schedules are submitted to and acceptable to Architect/Engineer as provided below. The progress schedule will be acceptable to Architect/Engineer as providing an orderly progression of the Work to completion within any specified Milestones and the Contract Times, but such acceptance will neither impose on Architect/Engineer responsibility for the sequencing, scheduling, or progress of Work nor interfere with or relieve Contractor from Contractor's full responsibility therefore, Contractor's schedule of Shop Drawing and Sample submissions will be acceptable to Architect/Engineer as providing a workable arrangement for reviewing and processing the required submittals. Contractor's schedule of values will be acceptable to Architect/Engineer as to form and substance.

ARTICLE 3 – CONTRACT DOCUMENTS: INTENT, AMENDING, REUSE

Intent:
3.1. The Contract Documents comprise the entire agreement between Owner and Contractor concerning the Work. The Contract Documents are complementary: what is called for by one is

as binding as if called for by all. The Contract Documents will be construed in accordance with the law of the place of the Project.

3.2. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any Work, materials, or equipment that may reasonably be inferred from the Contract Documents or from prevailing custom or trade usage as being required to produce the intended result will be furnished and performed whether or not specifically called for. When words or phrases, which have a well-known technical or construction industry or trade meaning are used to describe Work, materials, or equipment, such words or phrases shall be interpreted in accordance with the meaning. Clarifications and interpretations of the Contract Documents shall be issued by Architect/Engineer as provided in paragraph 9.4.

3.3. **Reference to Standards and Specifications of Technical Societies: Reporting and Resolving Discrepancies:**

3.3.1. Reference to standards, specifications, manuals or codes of any technical society, organization, or association, or to the Laws or Regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard, specification, manual, code or Laws or Regulations in effect at the time of opening of Bids (or, on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

3.3.2. If, during the performance of the Work, Contractor discovers any conflict, error, ambiguity, or discrepancy within the Contract Documents or between the Contract Documents and any provision of any such Law or Regulation applicable to the performance of the Work or of any such standard, specification, manual, or code or of any instruction of any Supplier referred to in paragraph 6.5., Contractor shall report it to Architect/Engineer in writing at once, and, Contractor shall not proceed with the Work affected thereby (except in an emergency as authorized by paragraph 6.18) until an amendment or supplement to the Contract Documents has been issued by one of the methods indicated in paragraph 3.5 or 3.6; provide, however, that Contractor shall not be liable to Owner or Architect/Engineer for failure to report any such conflict, error, ambiguity or discrepancy unless Contractor knew or reasonably should have known thereof.

3.3.3. Except as otherwise specifically stated in the Contract Documents or as may be provided by amendment or supplement thereto issued by one of the methods indicated in paragraph 3.5 or 3.6, the provisions of the Contract Documents shall take precedence in resolving any conflict, error, ambiguity, or discrepancy between the provisions of the Contract Documents and:

3.3.3.1. the provisions of any such standard, specification, manual, code, or instruction (whether or not specifically incorporated by reference in the Contract Documents): or

3.3.3.2. the provisions of any such Laws or Regulations applicable to the performance of the Work (unless such an interpretation of the provisions of the Contract Documents would result in violation of such Law or Regulation).

No provision of any such standard, specification, manual, code, or instruction shall be effective to change the duties and responsibilities of Owner, Contractor, or Architect/Engineer, or any of their subcontractors, consultants, agents, or employees from those set forth in the Contract

Documents, nor shall it be effective to assign to Owner, Architect/Engineer, or any of Architect/Engineer's Consultants, agents, or employees any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility inconsistent with the provisions of paragraph 9.13 or any other provision of the Contract Documents.

3.3.4. Whenever the plans or specifications are in conflict, resolution of such conflict shall be in the following order of precedence subject to agreement by Architect/Engineer:

Contract Agreement
- Addenda, with those of later date having precedence over those of earlier dates
- Bid Documents
- General Conditions
- Supplementary Conditions
- Technical Specifications
- Construction Drawings
- FAA General Provisions
- Florida DOT Standard Specifications

In case of our inconsistency within the Contract Drawings, the order of procedure is as follows:

Schedules
- Specific Details
- Typical Details
- Construction Drawings

3.4. Whenever in the Contract Documents the terms "as ordered," "as directed," "as required," "as allowed," "as approved" or terms of like effect or import are used, or the adjectives "reasonable," "suitable," "acceptable," "proper," or "satisfactory" or adjectives of like effect or import are used to describe a requirement, direction, review or judgment of Architect/Engineer as to the Work, it is intended that such requirement, direction, review, or judgment will be solely to evaluate, in general, the completed Work for compliance with the requirements of and information in the Contract Documents and conformance with the design concept of the completed Project as a functioning whole as shown or indicated in the Contract Documents (unless there is a specific statement indicating otherwise). The use of any such term or adjective shall not be effective to assign to Architect/Engineer any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority to undertake responsibility contrary to the provisions of paragraph 9.13 or any other provision of the Contract Documents.

Amending and Supplementing Contract Documents:

3.5. The Contract Documents may be amended to provide for additions, deletions, and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways:

3.5.1. a formal Written Amendment.

3.5.2. a Change Order (pursuant to paragraph 10.4) or

3.5.3. a Work Change Directive (pursuant to paragraph 10.1).

3.6. In addition, the requirements of the Contract Documents may be supplemented and minor variations, and deviations of the Work may be authorized, in one or more of the following ways:

3.6.1. a Field Order (pursuant to paragraph 9.5).

3.6.2. Architect/Engineer's approval of a Shop Drawing or Sample (pursuant to paragraphs 6.19 and 6.20), or

3.6.3. Architect/Engineer's written interpretation or clarification (pursuant to paragraph 9.4).

Reuse of Documents:

3.7. Contractor and any Subcontractor or Suppler or other person or organization performing or furnishing any of the Work under a direct or indirect contract with Owner (i) shall not have or acquire any title to or ownership rights in any of the Drawings, Specifications, or other documents (or copies of any thereof) prepared by or bearing the seal of Architect/Engineer or Architect/Engineer's Consultant, and (ii) shall not reuse any of such Drawings, Specifications, other documents, or copies on extensions of the Project or any other project without written consent of Owner and Architect/Engineer and specific written verification or adaption by Architect/Engineer.

ARTICLE 4 – AVAILABILITY OF LANDS: SUBSURFACE AND PHYSICAL CONDITIONS; REFERENCE POINTS

4.1 Availability of Lands:

Owner shall furnish, as indicated in the Contract Documents, the lands upon which the Work is to be performed, rights-of-way and easements for access thereto, and such other lands which are designated for the use of Contractor. Upon reasonable written request, Owner shall furnish Contractor with a correct statement of record legal title and legal description of the lands upon which the Work it to be performed and Owner's interest therein as necessary for giving notice of or filing a mechanic's lien against such lands in accordance with applicable Laws and Regulations. Owner shall identify any encumbrances or restrictions not of general application but specifically related to use of lands so furnished with which Contractor will have to comply in performing the Work. Easements for permanent structures or permanent in existing facilities will be obtained and paid for by Owner, unless otherwise provided in the Contract Documents. If Contractor and Owner are unable to agree on entitlement to or the amount or extent of any adjustments in the Contract Price or the Contract Times as a result of any delay in Owner's furnishing these lands, rights-of-way or easements. Contractor may make a claim therefore as provided in Articles 11 and 12. Contractor shall provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment.

4.2. Subsurface and Physical Conditions:

4.2.1. **Reports and Drawings:** Reference is made to the *Information Available to Contractors* for identification of:

4.2.1.1. **Subsurface Conditions:** Those reports of explorations and tests of subsurface conditions at or contiguous to the site that have been utilized by Architect/Engineer in preparing the Contract Documents; and

4.2.1.2. **Physical Conditions:** Those drawings of physical conditions in or relating to existing surface or subsurface structures at or contiguous to the site (except Underground Facilities) that have been utilized by Architect/Engineer in preparing the Contract Documents.

4.2.2. **Limited Reliance by Contractor Authorized; Technical Data:** Contractor may rely upon the general accuracy of the "technical data" contained in such reports and drawings, but such reports and drawings are not Contract Documents. Such "technical data" is identified in the *Information Available to Contractors*. Except for such reliance on such "technical data," Contractor may not rely upon or make any claim against Owner, Architect/Engineer, or any of Architect/Engineer's Consultants with respect to:

4.2.2.1. the completeness of such reports and drawings for Contractor's purposes, including, but not limited to, any aspects of the means, methods, techniques, sequences and procedures of construction to be employed by Contractor and safety precautions and programs incident thereto, or

4.2.2.2. other data, interpretations, opinions, and information contained in such reports or shown or indicated in such drawings, or

4.2.2.3. any Contractor interpretation of or conclusion drawn from any "technical data" or any such data, interpretations, opinions, or information.

4.2.3. **Notice of Differing Subsurface or Physical Conditions:** If Contractor believes that any subsurface or physical condition at or contiguous to the site that is uncovered or revealed either:

4.2.3.1. is of such a nature as to establish that any "technical data" on which Contractor is entitled to rely as provided in paragraphs 4.2.1 and 4.2.2 is materially inaccurate, or

4.2.3.2. is of such a nature as to require a change in the Contract Documents, or

4.2.3.3. differs materially from that shown or indicated in the Contract Documents, or

4.2.3.4. is of an unusual nature, and differs materially from conditions ordinarily encountered and generally recognized as inherent in work of the character provided for in the Contract Documents; then Contractor shall, promptly, but in no event later than fifteen (15) days, after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as permitted by paragraph 6.18), notify Owner and Architect/Engineer in writing about such condition. Contractor shall not further disturb such conditions or perform any Work in connection therewith (except as aforesaid) until receipt of written order to do so.

4.2.4. **Architect/Engineer's Review:** Architect/Engineer will promptly review the pertinent conditions, determine the necessity of Owner's obtaining additional exploration or tests with respect thereto and advise Owner in writing (with a copy to Contractor) of Architect/Engineer's findings and conclusions.

4.2.5. **Possible Contract Documents Change:** If Architect/Engineer concludes that a change in the Contract Documents is required as a result of a condition that meets one or more of the categories in paragraph 4.2.3., a Work Change Directive or a Change Order will be issued as provided in Article 10 to reflect and document the consequences of such change.

4.2.6. **Possible Price and Times Adjustments:** An equitable adjustment in the Contract Price or in the Contract Times, or both, will be allowed to the extent that the existence of such uncovered or revealed condition causes an increase or decrease in Contractor's cost of, or time required for performance of the Work; subject, however, to the following:

4.2.6.1. such condition must meet any one or more of the categories described in paragraphs 4.2.3.1 through 4.2.3.4. inclusive;

4.2.6.2. a change in the Contract Documents pursuant to paragraph 4.2.5 will not be an automatic authorization of nor a condition precedent to entitlement to any such adjustment:

4.2.6.3. with respect to Work that is paid for on a Unit Price Basis, any adjustment in Contract price will be subject to the provisions of Article 10 and Paragraph 11.9; and

4.2.6.4. Contractor shall not be entitled to any adjustment in the Contract Price or Times if;

4.2.6.4.1. Contractor knew of the existence of such conditions at the time Contractor made a final commitment to Owner in respect of Contract Price and Contract Times by the submission of a bid or becoming bound under a contract: or

4.2.6.4.2. The existence of such condition could reasonably have been discovered or revealed as a result of any examination, investigation, exploration, test, or study of the site and contiguous areas required by the Project Requirements or Contract Documents to be conducted by or for Contractor prior to Contractor's making such final commitment; or

4.2.6.4.3. Contractor failed to give the written notice within the time and as required by paragraph 4.2.3.

If Owner and Contractor are unable to agree on entitlement to or as to the amount or length of any such equitable adjustment in the Contract Price or Contract Times, a claim may be made therefore as provided in Articles 11 and 12. However, Owner, Architect/Engineer, and Architect/Engineer's Consultants shall not be liable to Contractor for any claims, costs, losses, or damages sustained by Contractor on or in connection with any other project or anticipated project.

4.3. Physical Conditions – Underground Facilities:

4.3.1. **Shown or Indicated:** The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the site is based on information and data furnished to Owner or Architect/Engineer by the owners of such Underground Facilities or by others. Unless it is otherwise expressly provided in the *Information Available to Contractors*:

4.3.1.1. Owner and Architect/Engineer shall not be responsible for the accuracy or completeness of any such information or data; and

4.3.1.2. The cost of all of the following will be included in the Contract Price and Contractor shall have full responsibility for: (i) reviewing and checking all such information and data, (ii) locating all Underground Facilities shown or indicated in the Contract Documents, (iii) coordination of the Work with the owners of such Underground Facilities during construction, and (iv) the safety and protection of all such Underground Facilities as provided in paragraph 6.20 and repairing any damage thereto resulting from the Work.

4.3.2. **Not Shown or Indicated:** If an Underground Facility is uncovered or revealed at or contiguous to the site which was not shown or indicated in the Contract Documents. Contractor shall, promptly after becoming aware thereof and before further disturbing conditions affected thereby or performing any Work in connection therewith (except in an emergency as required by paragraph 6.18), identify the owner of such Underground Facility and give written notice to that owner and to Owner and Architect/Engineer. Architect/Engineer will promptly review the Underground Facility and determine the extent, if any, to which a change is required in the Contract Documents to reflect and document the consequences of the existence of the Underground Facility. If Architect/Engineer concludes that a change in the Contract Documents is required, a Work Change Directive or a Change Order will be issued as provided in Article 10 to reflect and document such consequences. During such time, Contractor shall be responsible for the safety and protection of such Underground Facility as provided in paragraph 6.15. Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times, or both, to the extent that they are attributable to the existence of any Underground Facility that was not shown or indicated in the Contract Documents and that Contractor did not know of and could not reasonably have been expected to be aware of or to have anticipated. If Owner and Contractor are unable to agree on entitlement to or the amount or length of any such adjustment in Contract Price or Contract Times, Contractor may make a claim, therefore, as provided in Articles 11 and 12. However, Owner, Architect/Engineer, and Architect/Engineer's Consultants shall not be liable to Contractor for any claims, costs, losses or damages incurred or sustained by Contractor on or in connection with any other project or anticipated project.

Reference Points:

4.4. Owner shall provide Architect/Engineering surveys to establish reference points for construction which in Architect/Engineer's judgment are necessary to enable Contractor to proceed with the Work. Contractor shall be responsible for laying out the Work, shall protect and preserve the established reference points and shall make no changes or relocations without the prior written approval of Owner, Contractor shall report to Architect/Engineer whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points by professionally qualified personnel.

4.5. Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material:

4.5.1. Owner shall be responsible for any Asbestos, PCBs, Petroleum, Hazardous Waste, or Radioactive Material uncovered or revealed at the site which was not shown or indicated in Drawings or Specifications or identified in the Contract Documents to be within the scope of the Work and which may present a substantial danger to persons or property exposed thereto in connection with the Work at the site. Owner shall not be responsible for any such materials brought to the site by Contractor, Subcontractor, Suppliers, or anyone else for whom Contractor is responsible.

4.5.2. Contractor shall immediately: (i) stop all Work in connection with such hazardous condition and in any area affected thereby (except in an emergency as required by paragraph 6.18), and (ii) notify Owner and Architect/Engineer (and thereafter confirm such notice in writing). Owner shall promptly consult with Architect/Engineer concerning the necessity for Owner to retain a qualified expert to evaluate such hazardous condition to take corrective action, if any. Contractor shall not be required to resume Work in connection with such hazardous condition or in any such affected area until after Owner has obtained any required permits related thereto and delivered to Contractor special written notice: (i) specifying that such condition and any affected area is or has been rendered safe for the resumption of Work, or (ii) specifying any special conditions under which such Work may be resumed safely. If Owner and Contractor cannot agree as to entitlement to or the amount or extent of an adjustment, if any, in Contract Price or Contract Times as a result of such Work stoppage or such special conditions under which Work is agreed by Contractor to be resumed, either party may make a claim therefore as provided in Articles 11 and 12.

4.5.3. If after receipt of such special written notice Contractor does not agree to resume such Work based on a reasonable belief it is unsafe, or does not agree to resume such Work under such special conditions, then Owner may order such portion of the Work that is in connection with such hazardous condition or in such affected area to be deleted from the Work. If Owner and Contractor cannot agree as to entitlement to or the amount or extent of an adjustment, if any, in Contract Price or Contract Times as a result of deleting such portion of the Work, then either party may make a claim therefore as provided in Articles 11 and 12. Owner may have such deleted portion of the Work performed by Owner's own forces or others in accordance with Article 7.

4.5.4. The provisions of paragraphs 4.2 and 4.3 are not intended to apply to Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Material uncovered or revealed at the site.

ARTICLE 5 – BONDS AND INSURANCE

Performance, Payment, and Other Bonds:

5.1. Contractor shall furnish Performance and Payment Bonds, each in an amount at least equal to the Contract Price as security for the faithful performance and payment of all Contractor's obligations under the Contract Documents. These Bonds shall remain in effect at least until one year after the date when final payment becomes due, except as provided otherwise by Laws or Regulations or by the Contract Documents. Contractor shall also furnish such other Bonds as are required by the Supplementary Conditions. All Bonds shall be in the form prescribed by the Contract Documents except as provided otherwise by Laws or Regulations, and shall be executed by such sureties as are named in the current list of "Companies Holding Certificates of Authority as Acceptable Sureties on Federal Bonds and as Acceptable Reinsuring Companies" as published in Circular 570 (amended) by the Audit Staff. Bureau of Government Financial Operations, U.S. Treasury Department. All Bonds signed by an agent must be accompanied by a certified copy of such agent's authority to act.

5.2. If the surety on any Bond furnished by Contractor is declared a bankrupt or becomes insolvent or its right to do business is terminated in any state where any part of the Project is located or it ceases to meet the requirements of paragraph 5.1. Contractor shall within ten days thereafter substitute another bond and surety, both of which must be acceptable to Owner.

5.3. Licensed Sureties and Insurers; Certificates of Insurance:

5.3.1. All Bonds and insurance required by the Contract Documents to be purchased and maintained by Owner or Contractor shall be obtained from surety or insurance companies that are duly licensed or authorized in the jurisdiction in which the Project is located to issue Bonds or insurance policies for the limits and coverages so required. Such surety and insurance companies shall also meet such additional requirements and qualifications as may be provided in the Supplementary Conditions.

5.3.2. Contractor shall deliver to Owner, with copies to each additional insured identified in the Supplementary Conditions, certificates of insurance (and other evidence of insurance requested by Owner or any other additional insured) which Contractor is required to purchase and maintain in accordance with paragraph 5.4.

Contractor's Liability Insurance:

5.4. Contractor shall purchase and maintain such liability and other insurance as is appropriate for the Work being performed and furnished and as will provide protection from claims set forth below which may arise out of or result from Contractor's performance and furnishing of the Work and Contractor's other obligations under the Contract Documents, whether it is to be performed or furnished by Contractor, any Subcontractor or Supplier, or by anyone directly or indirectly employed by any of them to perform or furnish any of the Work, or by anyone for whose acts any of them may be liable:

5.4.1. claims under workers' compensation, disability benefits and other similar employee benefit acts;

5.4.2. claims for damages because of bodily injury, occupational sickness or disease, or death of Contractor's employees;

5.4.3. claims for damages because of bodily injury, sickness or disease, or death of any person other than Contractor's employees;

5.4.4. claims for damages insured by customary personal injury liability coverage which are sustained: (i) by any person as a result of an offense directly or indirectly related to the employment of such person by Contractor, or by any other person for any other reason;

5.4.5. claims for damages, other than to the Work itself, because of injury to or destruction of tangible property wherever located, including loss of use resulting therefrom; and

5.4.6. claims for damages because of bodily injury or death of any person or property damage arising out of the ownership, maintenance or use of any motor vehicle.

The policies of insurance so required by this paragraph 5.4 to be purchased and maintained shall:

5.4.7 Where applicable the Okaloosa County Board of County Commissioners shall be shown as Additionally Insured on the Certificate of Insurance.

5.4.8 Where applicable a Waiver of Subrogation shall be provided on the Insured Certificate of Insurance.

5.4.9. All insurance shall include the interest of all entities named and their respective officials, employees, Owner, Architect/Engineer, Architect/Engineer's Consultants and any other persons or entities identified in the Supplementary Conditions, all of whom shall be listed as additional insureds, and include coverage for the respective officers and employees of all such additional insureds;

5.4.10. include the specific coverages and be written for not less than the limits of liability provided in the Supplementary Conditions or required by Laws or Regulations, whichever is greater;

5.4.11 Contractor's Liability Insurance and the Owner's Protective Liability Insurance specified above shall be provided in not less than the following amount:

a.	Injury or death to more than one person or single occurrence	$1,000,000
b.	On and Off Premises Operations Liability	$1,000,000
c.	Explosion and Collapse Hazard	$1,000,000
d.	Underground Hazard	$1,000,000
e.	Completed Operations and Products Liability	$1,000,000
f.	Property damage in account of all occurrences	$1,000,000
g.	Independent Contractors Liability	$1,000,000
h.	Personal Injury Liability Insurance	$1,000,000

Contractor's Vehicle Insurance as follows:

1.	Injury or death to one person	$1,000,000
2.	Injury or death to more than one person or a single occurrence	$1,000,000
3.	Property Damage	$1,000,000
4.	Business Auto Liability, including all owned, non-owned and hired vehicles	$1,000,000

An Umbrella Policy may be used to meet the above limits.

All policies shall be drawn to cover a period of not less than one (1) year from the date of issue.

5.4.12. Include contractual liability insurance covering Contractor's indemnity obligations under paragraphs 6.9, 6.13.1, and 6.22.1 through 6.22.2.8;

5.4.13. contain a provision or endorsement that the coverage afforded will not be cancelled, materially changed or renewal refused until at least thirty days prior written notice has been given to Owner and Contractor and to each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued (and the certificates of insurance furnished by the Contractor pursuant to paragraph 5.3.2 will so provide);

5.4.14. remain in effect at least until final payment and at all times thereafter when Contractor may be correcting, removing or replacing defective Work in accordance with paragraph 13.12; and

5.4.15. with respect to completed operations insurance, and any insurance coverage written on an occurrence basis, remain in effect for at least two years after final payment (and Contractor shall furnish Owner and each other additional insured identified in the Supplementary Conditions to whom a certificate of insurance has been issued evidence satisfactory to Owner and any such additional insured of continuation of such insurance at final payment and one year thereafter).

5.4.16 Certificates of Insurance indicating the project name and number and evidencing all required coverage must be submitted not less than 10 days prior to the commencement of any work. The certificate holder (s) shall be as follows: Okaloosa County Board of County Commissioners, 302 North Wilson Street, Suite 301 Crestview, Florida, 32536.

Owner's Liability Insurance:

5.5. In addition to the insurance required to be provided by Contractor under paragraph 5.4, Owner, at Owner's option, may purchase and maintain at Owner's expense Owner's own liability insurance as will protect Owner against claims which may arise from operations under the Contract Documents. Any liability insurance carried by Owner is excess and non-contributory to any and all other coverage whether collectable or not.

Property Insurance:

5.6 Contractor shall purchase and maintain property insurance upon the Work at the site in amount of the full replacement cost thereof (subject to such deductible amounts as may be provided in these Supplementary Conditions or required by Laws and Regulations). This insurance shall:

5.6.1 include the interests of Owner, Contractor, Subcontractors, Architect/Engineer, Architect/Engineer's Consultants and any other persons or entities identified in the Supplementary Conditions each of whom is deemed to have an insurable interest an shall be listed as an insured or additional insured;

5.6.2 include expenses incurred in the repair or replacement of any insured property (including but not limited to fees and charges of Architect/Engineers and architects);

5.6.3 cover materials and equipment in transit for incorporation in the Work or stored at the site or at another location that was agreed to in writing by Owner prior to being incorporated in the Work, provided that such materials and equipment have been included in an Application for Payment recommended by Architect/Engineer; and

5.6.4 be maintained in effect until final payment is made unless otherwise agreed to in writing by Owner, Contractor, and Architect/Engineer with thirty days written notice to each other additional insured to whom a certificate of insurance has been issued.

5.7. NOT USED

5.8. NOT USED

5.9. Owner shall not be responsible for purchasing and maintaining any property insurance to protect the interests of Contractor, Subcontractors or others in the Work to the extent of any deductible amounts that are identified in the Supplementary Conditions. The risk of loss within such identified deductible amount, will be borne by Contractor, Subcontractor, or others suffering any such loss and if any of them wishes property insurance coverage within the limits of such amounts, each may purchase and maintain it at the purchaser's own expense.

5.10. NOT USED

5.11. NOT USED

Receipt and Application of Insurance Proceeds:

5.12. Any insureds loss under the policies of insurance required by paragraphs 5.5 and 5.6 will be adjusted with Owner and made payable to Owner as fiduciary for the insureds, as their interests may appear, subject to the requirements of any applicable mortgage clause and of paragraph 5.13. Owner shall deposit in a separate account any money so received, and shall distribute it in accordance with such agreement as the parties in interest may reach. If no other special agreement is reached, the damaged Work shall be repaired or replaced, the moneys so received applied on account thereof and the Work and the cost thereof covered by an appropriate Change Order or Written Amendment.

5.13. Owner as fiduciary shall have power to adjust and settle any loss with the insurers unless one of the parties in interest shall object in writing within fifteen days after the occurrence of loss to Owner's exercise of this power. If such objection be made, Owner as fiduciary shall make settlement with the insurers in accordance with such agreement as the parties in interest may reach. If no such agreement among the parties in interest is reached, Owner as fiduciary shall adjust and settle the loss with the insurers and, if required in writing by any party in interest, Owner as fiduciary shall give bond for the proper performance of such duties.

Acceptance of Bonds and Insurance; Option to Replace:

5.14. If either party (Owner or Contractor) has any objection to the coverage afforded by or other provisions of the Bonds or insurance required to be purchased and maintained by the other party in accordance with Article 5 on the basis of non-conformance with the Contract Documents, the objecting party shall so notify the other party in writing within ten days after receipt of the certificates (or other evidence requested) required by paragraph 2.7. Owner and Contractor shall each provide to the other such additional information in respect of insurance provided as the other may reasonably request. If either party does not purchase or maintain all of the Bonds and insurance required of such party by the Contract Documents, such party shall notify the other party in writing of such failure to purchase prior to the start of the Work, or of such failure to maintain prior to any change in the required coverage. Without prejudice to any other right or remedy, the other party may elect to obtain equivalent Bonds or insurance to protect such other party's interests at the expense of the party who was required to provide such coverage, and a Change Order shall be issued to adjust the Contract Price accordingly.

Partial Utilization – Property Insurance:

5.15. If Owner finds it necessary to occupy or use a portion or portions of the Work prior to Substantial Completion of all the Work, such use or occupancy may be accomplished in accordance with paragraph 14.10; provided that no such use or occupancy shall commence before the insurers providing the property insurance have acknowledged notice thereof and in writing effected any changes in coverage necessitated thereby. The insurers providing the property insurance shall consent by endorsement on the policy or policies, but the property insurance shall not be cancelled or permitted to lapse on account of any such partial use or occupancy.

ARTICLE 6 – CONTRACTOR'S RESPONSIBILITIES

Supervision and Superintendence:

6.1. Contractor shall supervise, inspect and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Contract Documents. Contractor shall be solely responsible for the means, methods, techniques, sequences and procedures of construction, but Contractor shall not be responsible for the negligence of others in the design or specification of a specific means, method, technique, sequence or procedure of construction which is shown or indicated in and expressly required by the Contract Documents. Contractor shall be responsible to see that the completed Work complies accurately with the Contract Documents.

6.2. Contractor shall keep on the Work at all times during its progress a competent resident superintendent, who shall not be replaced without written notice to Owner and Architect/Engineer except under extraordinary circumstances. The superintendent will be Contractor's representative at the site and shall have authority to act on behalf of Contractor. All communications to the superintendent shall be as binding as if given to CONTRACTOR.

Labor, Materials and Equipment:

6.3. Contractor shall provide competent, suitably qualified personnel to survey, lay out and construct the Work as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the site. Except as otherwise required for the safety or protection of persons or the Work or property at the site or adjacent thereto, and except as otherwise indicated in the Contract Documents, all Work at the site shall be performed during regular working hours and Contractor will not permit overtime work or the performance of Work on Saturday, Sunday or any legal holiday without Owner's written consent given after prior written notice to Architect/Engineer.

6.4. Unless otherwise specified in the General Requirements, Contractor shall furnish and assume full responsibility for all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up and completion of the Work.

6.5. All materials and equipment shall be of good quality and new, except as otherwise provided in the Contract Documents. All warranties and guarantees specifically called for by the Specifications shall expressly run to the benefit of Owner. If required by Architect/Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with instructions of the applicable Supplier, except as otherwise provided in the Contract Documents.

Progress Schedule:

6.6. Contractor shall adhere to the progress schedule established in accordance with paragraph 2.9 as it may be adjusted from time to time as provided below:

6.6.1. Contractor shall submit to Architect/Engineer for acceptance (to the extent indicated in paragraph 2.9) proposed adjustments in the progress schedule that will not change the Contract

Times (or Milestones). Such adjustments will conform generally to the progress schedule then in effect and additionally will comply with any provisions of the General Requirements applicable thereto.

6.6.2. Proposed adjustments in the progress schedule that will change the Contract Times (or Milestones) shall be submitted in accordance with the requirements of paragraph 12.1. Such adjustments may only be made by a Change Order or Written Amendment in accordance with Article 12.

6.7. Substitutes and "Or-Equal" Items:

6.7.1. Whenever an item of material or equipment is specified or described in the Contract Documents by using the name of a proprietary item or the name of a particular Supplier, the specification or description is intended to establish the type, function and quality required. Unless the specification or description contains or is followed by words reading that no like, equivalent or "or-equal" item or no substitution is permitted, other items of material or equipment or material or equipment of other Suppliers may be accepted by Architect/Engineer under the following circumstances:

6.7.1.1. "Or-Equal": If in Architect/Engineer's sole discretion an item of material or equipment proposed by Contractor is functionally equal to that named and sufficiently similar so that no change in related Work will be required, it may be considered by Architect/Engineer as an "or-equal" item, in which case review and approval of the proposed item may, in Architect/Engineer's sole discretion, be accomplished without compliance with some or all of the requirements for acceptance of proposed substitute items.

6.7.1.2. Substitute Items: If in Architect/Engineer's sole discretion an item of material or equipment proposed by Contractor does not qualify as an "or-equal" item under subparagraph 6.7.2, it will be considered a proposed substitute item. Contractor shall submit sufficient information as provided below to allow Architect/Engineer to determine that the item of material or equipment proposed is essentially equivalent to that named and an acceptable substitute therefore. The procedure for review by the Architect/Engineer will include the following as supplemented in the General Requirements and as Architect/Engineer may decide is appropriate under the circumstances. Requests for review of proposed substitute items of material or equipment will not be accepted by Architect/Engineer from anyone other than Contractor. If Contractor wishes to furnish or use a substitute item of material or equipment, Contractor shall first make written application to Architect/Engineer for acceptance thereof, certifying that the proposed substitute will perform adequately the functions and achieve the results called for by the general design, be similar in substance to that specified and be suited to the same use as that specified. The application will state the extent, if any, to which the evaluation and acceptance of the proposed substitute will prejudice Contractor's achievement of Substantial Completion on time, whether or not acceptance of the substitute for use in the Work will require a change in any of the Contract Documents (or in the provisions of any other direct contract with Owner for work on the Project) to adapt the design to the proposed substitute and whether or not incorporation or use of the substitute in connection with the Work is subject to payment of any license fee or royalty. All variations of the proposed substitute from that specified will be identified in the application and available maintenance, repair and replacement service will be indicated. The application will also contain an itemized estimate of all costs or credits that will result directly or indirectly from acceptance of such substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which will be considered by Architect/Engineer

in evaluating the proposed substitute. Architect/Engineer may require Contractor to furnish additional data about the proposed substitute.

6.7.1.3. Contractor's Expense: All data to be provided by Contractor in support of any proposed "or-equal" or substitute item will be at Contractor's expense.

6.7.2. Substitute Construction Methods or Procedures: If a specific means, method, technique, sequence or procedure of construction is shown or indicated in an expressly required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, technique, sequence or procedure of construction acceptable to Architect/Engineer. Contractor shall submit sufficient information to allow Architect/Engineer, in Architect/Engineer's sole discretion, to determine that the substitute proposed is equivalent to that expressly called for by the Contract Documents. The procedure for review by Architect/Engineer will be similar to that provided in subparagraph 6.7.3.

6.7.3. Architect/Engineer's Evaluation: Architect/Engineer will be allowed a reasonable time within which to evaluate each proposal or submittal made pursuant to paragraphs 6.7.1.1 and 6.7.1.2. Architect/Engineer will be the sole judge of acceptability. No "or-equal" or substitute will be ordered, installed or utilized without Architect/Engineer's prior written acceptance which will be evidenced by either a Change Order or an approved Shop Drawing. Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any "or-equal" or substitute. Architect/Engineer will record time required by Architect/Engineer and Architect/Engineer's Consultants in evaluating substitutes proposed or submitted by Contractor pursuant to paragraphs 6.7.1.1 and 6.7.1.2 and in making changes in the Contract Documents (or in the provisions of any other direct contract with Owner for work on the Project) occasioned thereby. Whether or not Architect/Engineer accepts a substitute item so proposed or submitted by Contractor, Contractor shall reimburse Owner for the changes of Architect/Engineer and Architect/Engineer's Consultants for evaluating each such proposed substitute item.

6.8. Concerning Subcontractors, Suppliers and Others:

The Contractor shall submit a list of Subcontractors and major Material Suppliers for the Owner's approval within (24) hours after Bid Opening. Such list shall be accompanied by an experience statement with pertinent information as to similar projects and other evidence of qualifications from each such Subcontractor, person and organization requested by Owner. If Owner, after due investigation has reasonable objections to any proposed Subcontractor, other person or organization, the Owner may before giving the Notice of Award request the apparent successful Contractor to submit an acceptable Subcontractor without an increase in Bid Price. If the apparent successful Contractor declines to make any such substitution, the Contract shall not be awarded to such Contractor, but his declining to make any such substitution will not constitute grounds for sacrificing his Bid Security. Any Subcontractor, other person or organization so listed and to whom Owner does not make written objection prior to the giving of the Notice of Award will be deemed acceptable to Owner.

6.8.1. Contractor shall not employ any Subcontractor, Supplier or other person or organization (including those acceptable to Owner and Architect/Engineer as indicated in paragraph 6.8.2), whether initially or as a substitute, against whom Owner or Architect/Engineer may have reasonable objection. Contractor shall not be required to employ any subcontractor,

Supplier or other person or organization to furnish or perform any of the Work against whom Contractor has reasonable objection.

6.8.2. If the Supplementary Conditions and/or Bid Documents require the identity of certain Subcontractors, Suppliers or other persons or organizations (including those who are to furnish the principal items of materials or equipment) to be submitted to Owner in advance of the specified date prior to the Effective Date of the Agreement for acceptance by Owner and Architect/Engineer, and if Contractor has submitted a list thereof in accordance with the Supplementary Conditions, Owner's or Architect/Engineer's acceptance (either in writing or by failing to make written objection thereto by the date indicated for acceptance or objection in the project documents or the Contract Documents) of any such Subcontractor, Supplier or other person or organization so identified may be revoked on the basis of reasonable objection after due investigation, in which case Contractor shall submit an acceptable substitute, the Contract Price will be adjusted by the difference in the cost occasioned by such substitution and an appropriate Change Order will be issued or Written Amendment signed. No acceptance by Owner or Architect/Engineer of any such Subcontractor, Supplier or other person or organization shall constitute a waiver of any right of Owner or Architect/Engineer to reject defective Work.

6.8.3. Contractor shall be fully responsible to Owner and Architect/Engineer for all acts and omissions of the Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with Contractor just as Contractor is responsible for Contractor's own acts and omissions. Nothing in the Contract Documents shall create for the benefit of any such Subcontractor, Supplier, or other person or organization any contractual relationship between Owner or Architect/Engineer and any such Subcontractor, Supplier or other person or organization, nor shall it create any obligation on the part of Owner or Architect/Engineer to pay or to see to the payment of any moneys due any such Subcontractor, Supplier or other person or organization except as may otherwise be required by Laws and Regulations.

6.8.4. Contractor shall be solely responsible for scheduling and coordinating the Work of Subcontractors, Suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect contract with Contractor. Contractor shall require all Subcontractors, Suppliers and such other persons and organizations performing or furnishing any of the Work to communicate with the Architect/Engineer through Contractor.

6.8.5. The divisions and sections of the Specifications and the identifications of any drawings shall not control Contractor in dividing the Work among Subcontractors or Suppliers or delineating the Work to be performed by any specific trade.

6.8.6. All Work performed by Contractor by a Subcontractor or Supplier will be pursuant to an appropriate agreement between Contractor and the Subcontractor or Supplier which specifically binds the Subcontractor or Supplier to the applicable terms and conditions of the Contract Documents for the benefit of Owner and Architect/Engineer. Whenever any such agreement is with a Subcontractor or Supplier who is listed as an additional insured on the property insurance provided in paragraph 5.5. or 5.6. the agreement between the Contractor and the Subcontractor or Supplier will contain provisions whereby the Subcontractor or Supplier waives all rights against Owner, Contractor, Architect/Engineer, Architect/Engineer's Consultants and all other additional insureds for all losses and damages caused by, arising out of or resulting from any of the perils covered by such policies and any other property insurance applicable to the

Work. If the insurers on any such policies require separate waiver forms to be signed by any Subcontractor or Supplier, Contractor will obtain the same.

6.9 Patent Fees and Royalties:

Contractor shall pay all license fees and royalties and assume all costs incident to the use in the performance of the Work or the incorporation in the Work of any invention, design, process, product or device which is the subject of patent rights or copyrights held by others. If a particular invention, design, process, product or device is specified in the Contract Documents for use in the performance of the Work and if to the actual knowledge of Owner or Architect/Engineer its use is subject to patent rights or copyrights calling for the payment of any license fee or royalty to others, the existence of such rights shall be disclosed by Owner in the Contract Documents. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner, Architect/Engineer, Architect/Engineer's Consultants and the officers, directors, employees, agents and other consultants of each and any of them from and against all claims, costs, losses and damages arising out of or resulting from any infringement of patent rights or copyrights incident to the use in the performance of the Work or resulting from the incorporation in the Work of any invention, design, process, product or device not specified in the Contract Documents.

6.10. Permits:

Unless otherwise provided in the Supplementary Conditions, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work, which are applicable at the time of opening of Bids, or, if there are no Bids, on the Effective Date of the Agreement. Contractor shall pay all charges of utility owners for connections to the Work, and Owner shall pay all charges of such utility owners for capital costs related thereto such as plant investment fees.

6.11. Laws and Regulations:

6.11.1. Contractor shall give all notices and comply with all Laws and Regulations applicable to furnishing and performance of the Work. Except where otherwise expressly required by applicable Laws and Regulations, neither Owner nor Architect/Engineer shall be responsible for monitoring Contractor's compliance with any Laws or Regulations.

6.11.2. If Contractor performs any Work knowing or having reason to know that it is contrary to Laws or Regulations, Contractor shall bear all claims, costs, losses and damages caused by, arising out of or resulting therefrom: however, it shall not be Contractor's primary responsibility to make certain that the Specifications and Drawings are in accordance with Laws and Regulations, but this shall not relieve Contractor or Contractor's obligations under paragraph 3.3.2.

6.12. Taxes:

Contractor shall pay all sales, consumer, use and other similar taxes required to be paid by Contractor in accordance with the Laws and Regulations of the place of the Project which are applicable during the performance of the Work.

6.13. Use of Premises:

6.13.1 Contractor shall confine construction equipment, the storage of materials and equipment and the operations of workers to the site and land and areas identified in and permitted by the Contract Documents, rights-of-way, permits and easements, and shall not unreasonably encumber the premises with construction equipment or other materials or equipment. Contractor shall assume full responsibility for any damage to any such land or area, or to the owner or occupant thereof or of any adjacent land or areas, resulting from the performance of the Work. Should any claim be made by any such owner or occupant because of the performance of the Work, Contractor shall promptly settle with such other party by negotiation or otherwise resolve the claim by dispute resolution proceeding or at law. Contractor shall, to the fullest extent permitted by Laws and Regulations, indemnify and hold harmless Owner, Architect/Engineer, Architect/Engineer's Consultant and anyone directly or indirectly employed by any of them from and against all claims costs, losses and damages arising out of or resulting from any claim or action, legal or equitable, brought by any such owner or occupant against Owner, Architect/Engineer or any other party indemnified hereunder to the extent caused by or based upon Contractor's performance of the Work.

6.13.2. During the progress of the Work, Contractor shall keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the Work. At the completion of the Work Contractor shall remove all waste materials, rubbish and debris from and about the premises as well as all tools, appliances, construction equipment and machinery and surplus materials. Contractor shall leave the site clean and ready for occupancy by Owner at Substantial Completion of the Work. Contractor shall restore to original condition all property not designated for alteration by the Contract Documents.

6.13.3. Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

6.14. Record Documents:

Contractor shall maintain in a safe place at the site one record copy of all Drawings, Specifications, Addenda, Written Amendments, Change Orders, Work Change Directives, Field Orders and written interpretations and clarifications (issued pursuant to paragraph 9.4) in good order and annotated to show all changes made during construction. These record documents together with all approved Samples and a counterpart of all approved Shop Drawings will be available to Architect/Engineer for reference. Upon completion of the Work, these record documents, Samples and Shop Drawings will be delivered to Architect/Engineer for Owner.

6.15. Safety and Protection:

Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of, and shall provide the necessary protection to prevent damage, injury or loss to:

6.15.1. all persons on the Work site or who may be affected by the Work;

6.15.2. all the Work and materials and equipment to be incorporated therein, whether in storage on or off the site; and

6.15.3. other property at the site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and Underground Facilities not designated for removal, relocation or replacement in the course of construction.

Contractor shall comply with all applicable Laws and Regulations of any public body having jurisdiction for safety of persons or property or to protect them from damage, injury of loss; and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall notify owners of adjacent property and of Underground Facilities and utility owners when prosecution of the Work may affect them, and shall cooperate with them in the protection, removal, relocation and replacement of their property. All damage, injury or loss to any property referred to in paragraph 6.15.2. or 6.15.3. caused, directly or indirectly, in whole or in part, by Contractor, any Subcontractor, Supplier or any other person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, shall be remedied by Contractor (except damage or loss attributable to the fault of Drawings or Specifications or to the acts or omissions of Owner or Architect/Engineer or Architect/Engineer's Consultant or anyone employed by any of them or anyone for whose acts any of them may be liable, and not attributable, directly or indirectly, in whole or in part, to the fault or negligence of Contractor or any Subcontractor, Supplier or other person or organization directly or indirectly employed by any of them). Contractor's duties and responsibilities for safety and for protection of the Work shall continue until such time as all the Work is completed and Architect/Engineer has issued a notice to Owner and Contractor in accordance with paragraph 14.13. that the Work is acceptable (except as otherwise expressly provided in connection with Substantial Completion).

6.16. Safety Representative:

Contractor shall designate a qualified and experienced safety representative at the site whose duties and responsibilities shall be the prevention of accidents and the maintaining and supervising of safety precautions and programs.

6.17. Hazard Communication Programs:

Contractor shall be responsible for coordinating any exchange of material safety data sheets or other hazard communication information required to be made available to or exchanged between or among employers at the site in accordance with Laws or Regulations.

6.18. Emergencies:

In emergencies affecting the safety or protection of persons or the Work or property at the site or adjacent thereto, Contractor, without special instruction or authorization from Owner or Architect/Engineer, is obligated to act to prevent threatened damage, injury or loss. Contractor shall give Architect/Engineer prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If Architect/Engineer determines that a change in the Contract Documents is required because of the action taken by Contractor in response to such an emergency, a Work Change Directive or Change Order will be issued to document the consequences of such action.

6.19. Shop Drawings and Samples:

6.19.1. Contractor shall submit Shop Drawings to Architect/Engineer for review and approval in accordance with the accepted schedule of Shop Drawings and Sample submittals (see paragraph 2.9.). All submittals will be identified as Architect/Engineer may require and in the number of copies specified in the General Requirements. The data shown on the Shop Drawings will be complete with respect to quantities, dimensions, specified performance and design criteria, materials and similar data to shown Architect/Engineer the materials and equipment Contractor proposes to provide and to enable Architect/Engineer to review the information for the limited purposes required by paragraph 6.26.

6.19.2. Contractor shall also submit Samples to Architect/Engineer for review and approval in accordance with said accepted schedule of Shop Drawings and Sample submittals. Each Sample will be identified clearly as to material, Supplier, pertinent data such as catalog numbers and the use for which intended and otherwise as Architect/Engineer may require to enable Architect/Engineer to review the submittal for the limited purposes required by paragraph 6.20. The numbers of each Sample to be submitted will be as specified in the Specifications.

6.20. Submittal Procedures:

6.20.1. Before submitting each Shop Drawing or Sample, Contractor shall have determined and verified:

6.20.1.1 all field measurements, quantities, dimensions, specified performance criteria, installation requirements, materials, catalog numbers and similar information with respect thereto,

6.20.1.2. all materials with respect to intended use, fabrication, shipping, handling storage, assembly and installation pertaining to the performance of the Work, and

6.20.1.3. all information relative to Contractor's sole responsibilities in respect of means, methods, techniques, sequences and procedures of construction and safety precautions and programs incident thereto.

Contractor shall also have reviewed and coordinated each Shop Drawing or Sample with other Shop Drawings and Samples and with the requirements of the Work and the Contract Documents.

6.20.2 Each submittal will bear a stamp or specific written indication that Contractor has satisfied Contractor's obligations under the Contract Documents with respect to Contractor's review and approval of that submittal.

6.20.3. At the time of each submission, Contractor shall give Architect/Engineer specific written notice of such variations, if any, that the Shop Drawing or Sample submitted may have from the requirements of the Contract Documents, such notice to be in a written communication separate from the submittal; and, in addition, shall cause a specific notation to be made on each Shop Drawing and Sample submitted to Architect/Engineer for review and approval of each such variation.

6.20.4. Architect/Engineer will review and approve Shop Drawings and Samples in accordance with the schedule of Shop Drawings and Sample submittals accepted by Architect/Engineer as required by paragraph 2.9. Architect/Engineer's review and approval will be only to determine if the items covered by the submittals will, after installation or incorporation in the Work, conform to the information given in the Contract Documents and be compatible with the design concept of

the completed Project as a functioning whole as indicated by the Contract Documents. Architect/Engineer's review and approval will not extend to means, methods, techniques, sequences or procedures of construction (except where a particular means, method, technique, sequence or procedure of construction is specifically and expressly called for by the Contract Documents) or to safety precautions or programs incident thereto. The review and approval of a separate item as such will not indicate approval of the assembly in which the item functions. Contractor shall make corrections required by Architect/Engineer, and shall return the required number of corrected copies of Shop Drawings and submit as required new Samples for review and approval. Contractor shall direct specific attention in writing to revisions other than the corrections called for by Architect/Engineer on previous submittals.

6.20.5. Architect/Engineer's review and approval of Shop Drawings or Samples shall not relieve Contractor from responsibility for any variation from the requirements of the Contract Documents unless Contractor has in writing called Architect/Engineer's attention to each such variation at the time of submission as required by paragraph 6.20.3 and Architect/Engineer has given written approval of each such variation by specific written notation thereof incorporated in or accompanying Shop Drawing or Sample approval; nor will any approval by Architect/Engineer relieve Contractor from responsibility for complying with the requirements of paragraph 6.20.

6.20.6. Where a Shop Drawing or Sample is required by the Contract Documents or the schedule of Shop Drawings and Sample submissions accepted by Architect/Engineer as required by paragraph 2.9, any related Work performed prior to Architect/Engineer's review and approval of the pertinent submittal will be at the sole expense and responsibility of Contractor.

6.21. Continuing the Work:

Contractor shall carry on the Work and adhere to the progress schedule during all disputes or disagreements with Owner. No Work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted by paragraph 15.5 or as Owner and Contractor may otherwise agree in writing.

6.22. Contractor's General Warranty and Guarantee:

6.22.1. Contractor warrants and guarantees to Owner, Architect/Engineer and Architect/Engineer's Consultants that all Work will be in accordance with the Contract Documents and will not be defective. Contractor's warranty and guarantee hereunder excludes defects or damage caused by:

6.22.1.1. abuse, modification or improper maintenance or operation by persons other than Contractor, Subcontractors or Suppliers; or

6.22.1.2. normal wear and tear under normal usage.

6.22.2. Contractor's obligation to perform and complete the Work in accordance with the Contract Documents shall be absolute. None of the following will constitute an acceptance of Work that is not in accordance with the Contract Documents or a release of Contractor's obligation to perform the Work in accordance with the Contract Documents:

6.22.2.1. observations by Architect/Engineer;

6.22.2.2. recommendation of any progress or final payment by Architect/Engineer;

6.22.2.3. the issuance of a certificate of Substantial Completion or any payment by Owner to Contractor under the Contract Documents;

6.22.2.4. use or occupancy of the Work or any part thereof by Owner;

6.22.2.5. any acceptance by Owner or any failure to do so;

6.22.2.6. any review and approval of Shop Drawing or Sample submittal or the issuance of a notice of acceptability by Architect/Engineer pursuant to paragraph 14.13;

6.22.2.7. any inspection, test or approval by others; or

6.22.2.8. any correction of defective Work by Owner.

6.23 Indemnification:

6.23.1. To the fullest extent permitted by Laws and Regulations. Contractor shall indemnify and hold harmless Owner, Architect/Engineer, Architect/Engineer's Consultants and the officers, directors, employees, agents and other consultants of each and any of them from and against all claims, costs, losses and damages (including but not limited to all fees and charges of Architect/Engineers, architects, attorneys and other professionals and all court or dispute resolution costs) caused by, arising out of or resulting from the performance of the Work, provided that any such claim, cost, loss or damage: (i) is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom, and (ii) is caused in whole or in part by any negligent act or omission of Contractor, any Subcontractor, any Supplier, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work or anyone for whose acts any of them may be liable, regardless of whether or not caused in part by any negligence or omission of a person or entity indemnified hereunder or whether liability is imposed upon such indemnified party by Laws and Regulations regardless of the negligence of any such person or entity.

6.23.2. In any and all claims against Owner or Architect/Engineer or any of their respective consultants, agents, officers, directors or employees by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, any person or organization directly or indirectly employed by any of them to perform or furnish any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under paragraph 6.23.1 shall not be limited in any way by any limitation on the amount or type of damages, compensation or benefits payable by or for Contractor or any such Subcontractor, Supplier or other person or organization under workers' compensation acts, disability benefit acts or other employee benefit acts.

6.23.3. The indemnification obligations of Contractor under paragraph 6.23.1 shall not extend to the liability of Architect/Engineer and Architect/Engineer's Consultants, officers, directors, employees or agents caused by the professional negligence, errors or omissions of any of them.

6.24. Survival of Obligations:

All representations, indemnifications, warranties and guarantees made in, required by or given in accordance with the Contract Documents, as well as all continuing obligations indicated in the Contract Documents, will survive final payment, completion and acceptance of the Work and termination or completion of the Agreement.

ARTICLE 7 – OTHER WORK

Related Work at Site:

7.1. Owner may perform other work related to the Project at the site by Owner's own forces, or let other direct contracts therefore which shall contain General Conditions similar to these, or have other work performed by utility owners. If the fact that such other work is to be performed was not noted in the Contract Documents, then; (i) written notice thereof will be given to Contractor prior to starting any such other work, and (ii) Contractor may make a claim therefore as provided in Articles 11 and 12 if Contractor believes that such performance will involve additional expense to Contractor or requires additional time and the parties are unable to agree as to the amount or extent thereof.

7.2. Contractor shall afford each other contractor who is a party to such a direct contract and each utility owner (and Owner if Owner is performing the additional work with Owner's employees) proper and safe access to the site and a reasonable opportunity for the introduction and storage of materials and equipment and the execution of such other work and shall properly connect and coordinate the Work with theirs. Unless otherwise provided in the Contract Documents. Contractor shall do all cutting, fitting, and patching of the Work that may be required to make its several parts come together properly and integrate with such other work. Contractor shall not endanger any work of others by cutting, excavating or otherwise altering their work and will only cut or alter their work with the written consent of Architect/Engineer and the others whose work will be affected. The duties and responsibilities of Contractor under this paragraph are for the benefit of such utility owners and other contractors to the extent that there are comparable provisions for the benefit of Contractor in said direct contracts between Owner and such utility owners and other contractors.

7.3. If the proper execution or results of any part of Contractor's Work depends upon work performed by others under this Article 7. Contractor shall inspect such other work and promptly report to Architect/Engineer in writing any delays, defects or deficiencies in such other work that render it unavailable or unsuitable for the proper execution and results of Contractor's Work. Contractor's failure so to report will constitute an acceptance of such other work as fit and proper for integration with Contractor's Work except for latent or non-apparent defects and deficiencies in such other work.

Coordination:

7.4. If Owner contracts with others for the performance of other work on the Project at the site, the following will be set forth in Supplementary Conditions:

7.4.1. the person, firm or corporation who will have authority and responsibility for coordination of the activities among the various prime contractors will be identified;

7.4.2. the specific matters to be covered by such authority and responsibility will be itemized: and

7.4.3. the extent of such authority and responsibilities will be provided.

Unless otherwise provided in the Supplementary Conditions, Owner shall have sole authority and responsibility in respect of such coordination.

ARTICLE 8 – OWNER'S RESPONSIBILITIES

8.1. Except as otherwise provided in these General Conditions, Owner shall issue all communications to Contractor through Architect/Engineer.

8.2. In case of termination of the employment of Architect/Engineer, Owner shall appoint an Architect/Engineer, whose status under the Contract Documents shall be that of the former Architect/Engineer.

8.3. Owner shall furnish the data required of Owner under the Contract Documents promptly and shall make payments to Contractor promptly when they are due as provided in paragraphs 14.4 and 14.13.

8.4. Owner's duties in respect of providing lands and easements and providing Architect/Engineering surveys to establish reference points are set forth in paragraphs 4.1 and 4.4. Paragraph 4.2 refers to Owner's identifying and making available to Contractor copies of reports of explorations and tests of subsurface conditions at the site and drawings of physical conditions in existing structures at or contiguous to the site that have been utilized by Architect/Engineer in preparing the Contract Documents.

8.5. Owner's responsibilities in respect of purchasing and maintaining liability and property insurance are set forth in paragraphs 5.5 through 5.6.

8.6. Owner is obligated to execute Change Orders as indicated in paragraph 10.4.

8.7. Owner's responsibility in respect of certain inspections, tests and approvals is set forth in paragraph 13.4.

8.8. In connection with Owner's right to stop Work or suspend Work, see paragraphs 13.10 and 15.1. Paragraph 15.2 deals with Owner's right to terminate services of Contractor under certain circumstances.

8.9. The Owner shall not supervise, direct or have control or authority over, nor be responsible for, Contractor's means, methods, techniques, sequences or procedures of construction or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the furnishing or performance of the Work. Owner will not be responsible for Contractor's failure to perform or furnish the Work in accordance with the Contract Documents.

8.10. Owner's responsibility in respect of undisclosed Asbestos, PCBs, Petroleum, Hazardous Waste or Radioactive Materials uncovered or revealed at the site is set forth in paragraph 4.5.

8.11. If and to the extent Owner has agreed to furnish Contractor reasonable evidence that financial arrangements have been made to satisfy Owner's obligations under the Contract

Documents, Owner's responsibility in respect thereof will be as set forth in the Supplementary Conditions.

ARTICLE 9 – ARCHITECT/ENGINEER'S STATUS DURING CONSTRUCTION

Owner's Representative:

9.1. Architect/Engineer will be Owner's representative during the construction period. The duties and responsibilities and the limitations of authority of Architect/Engineer as Owner's representative during construction are set forth in the Contract Documents and shall not be extended without written consent of Owner and Architect/Engineer.

Visits to Site:

9.2. Architect/Engineer will make visits to the site at intervals appropriate to the various stages of construction as Architect/Engineer deems necessary in order to observe as an experienced and qualified design professional the progress that has been made and the quality of the various aspects of Contractor's executed Work. Based on information obtained during such visits and observations, Architect/Engineer will endeavor for the benefit of Owner to determine, in general, if the Work is proceeding in accordance with the Contract Documents. Architect/Engineer will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. Architect/Engineer's efforts will be directed toward providing for Owner a greater degree of confidence that the completed Work will conform generally to the Contract Documents. On the basis of such visits and on-site observations, Architect/Engineer will keep Owner informed of the progress of the Work and will endeavor to guard Owner against defective Work. Architect/Engineer's visits and on-site observations are subject to all the limitations on Architect/Engineer's authority and responsibility set forth in paragraph 9.13, and particularly, but without limitation, during or as a result of Architect/Engineer's on-site visits or observations of Contractor's Work Architect/Engineer will not supervise, direct, control or have authority over or be responsible for Contractor's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the furnishing or performance of the Work.

Project Representative:

9.3. If Owner and Architect/Engineer agree, Architect/Engineer will furnish a Resident Project Representative to assist Architect/Engineer in providing more continuous observation of the Work. The responsibilities and authority and limitations thereon of any such Resident Project Representative and assistants will be as provided in paragraph 9.13 and in the Supplementary Conditions. If Owner designates another representative or agent to represent Owner at the site who is not Architect/Engineer's Consultant, agent or employee, the responsibilities and authority and limitations thereon of such other person will be as provided in the Supplementary Conditions.

9.3.1 Architect/Engineer may furnish a Resident Project Representative, assistants and other field staff as needed, to assist Owner in observing performance of the Work. The Resident Project Representative is to observe and inspect, in the Owner's interest, the materials furnished and the work done as the work progresses in order to insure full and complete compliance with the contract and to verify quantities of work completed.

9.3.2 Owner may also designate one of its employees to represent Owner for these purposes.

9.3.3 Architect/Engineer, Resident Project Representative, Owner and all such other persons referred to shall have unrestricted access to all parts of the Work. Contractor shall cooperate by supplying necessary facilities and assistance required by above persons to carry out their work of observation and inspection.

9.3.4 It is not the function of the Architect/Engineer, Resident Project Representative or Owner to supervise or direct the manner in which the work to be done under this Contract is carried on or conducted. The Architect/Engineer, Resident Project Representative or Owner is not responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the work, and they will not be responsible for the Contractor's failure to carry out the work in accordance with the Contract Documents. Nevertheless, Contractor agrees that any method or procedure, which in the opinion of the Architect/Engineer or Owner does not achieve the required results or quality of the work specified, shall be discontinued immediately upon the order of the Architect/Engineer.

9.3.5 All communications between Contractor and Architect/Engineer or Contractor and Owner are to be through the Resident Project Representative.

9.3.6 Duties and Responsibilities of Resident Project Representative (RPR):

1) RPR will act as directed by and under the supervision of Architect/Engineer and/or Owner, and will confer with Architect/Engineer and Owner regarding RPR's actions. RPR's dealings in matters pertaining to the on-site work shall in general be with Architect/Engineer and Contractor keeping Owner advised as necessary. RPR's dealings with subcontractors shall only be through or with the full knowledge and approval of Contractor.

2) Review progress schedule, schedule of Shop Drawing submittals and schedule of values prepared by Contractor and consult with Architect/Engineer and Owner concerning acceptability.

3) Attend meetings with Contractor, such as pre-construction conferences, progress meetings, job conferences and other project-related meetings, and prepare and circulate copies of minutes thereof.

4) Serve as Architect/Engineer's and Owner's liaison with Contractor, working principally through Contractor's superintendent and assist in understanding the intent of the Contract Documents.

5) Advise Architect/Engineer, Owner and Contractor of the commencement of any Work requiring a Shop Drawing or sample if the submittal has not been approved by Architect/Engineer.

6) Conduct on-site observations of the Work in progress to assist Architect/Engineer and Owner in determining if the Work is in general proceeding in accordance with the Contract Documents. Report to Architect/Engineer and Owner whenever RPR believes that any Work is unsatisfactory, faulty or defective or does not conform to the Contract Documents, or has been damaged, or does not meet the requirements of any inspection, test or approval required to be made; and advise Architect/Engineer and Owner of Work that RPR believes should be corrected

or rejected or should be uncovered for observation, or requires special testing, inspection or approval.

7) Report to Architect/Engineer and Owner when clarifications and interpretations of the Contract Documents are needed and transmit to Contractor clarifications and interpretations as issued by Architect/Engineer.

8) Consider and evaluate Contractor's suggestions for modifications in Drawings or Specifications and report with RPR's recommendations to Architect/Engineer and Owner. Transmit to Contractor decisions as issued by Architect/Engineer and/or Owner.

9) Maintain orderly files for correspondence, reports of job conferences, Shop Drawings and samples, reproductions of original Contract Documents including all Work Directive Changes, Addenda, Change Orders, Field Orders, additional Drawings issued subsequent to the execution of the Contract, Architect/Engineer's clarifications and interpretations of the Contract Documents, progress reports, and other Project related documents.

10) Keep a diary or log book, recording Contractor hours on the job site, weather conditions, data relative to questions of Work Directive Changes, Change Orders or Changed conditions, list of job site visitors, daily activities, decisions, observations in general, and specific observations in more detail as in the case of observing test procedures; and send copies to Architect/Engineer and Owner.

11) Record names, addresses and telephone numbers of all Contractors, subcontractors and major suppliers of materials and equipment.

12) Furnish Architect/Engineer and Owner periodic reports as required of progress of the Work and of Contractor's compliance with the progress schedule and schedule of Shop Drawing and sample submittals.

13) Draft proposed Change Orders and Work Directive Changes, obtaining backup material from Contractor and recommend to Architect/Engineer and Owner Change Orders, Work Directive Changes, and Field Orders.

14) Report immediately to Architect/Engineer and Owner upon the occurrence of any accident.

15) Review applications for payment with Contractor for compliance with the established procedure for their submission and forward with recommendations to Architect/Engineer, noting particularly the relationship of the payment requested to the schedule of values, Work completed and materials and equipment delivered at the site but not incorporated in the Work.

16) During the course of the Work, verify that certificates, maintenance and operation manuals and other data required to be assembled and furnished by Contractor are applicable to the items actually installed and in accordance with the Contract Documents, and have this material delivered to Architect/Engineer for review and forwarding to Owner prior to final payment for the work.

17) Before Architect/Engineer issues a Certificate of Substantial Completion, submit to Contractor a list of observed items requiring completion or correction.

18) Conduct final inspection in the company of Architect/Engineer, Owner and Contractor and prepare a final list of items to be completed or corrected.

19) Observe that all items on final list have been completed or corrected and make recommendations to Architect/Engineer and Owner concerning acceptance.

9.3.7 Limitations of Authority of Resident Project Representative (RPR):

1) Shall not authorize any deviation from the Contract Documents or substitution of materials or equipment, unless authorized by Architect/Engineer or Owner.

2) Shall not exceed limitations of Architect/Engineer's authority as set forth in the Contract Documents.

3) Shall not undertake any of the responsibilities of Contractor, subcontractors or Contractor's superintendent.

4) Shall not advise on, issue directions relative to or assume control over any aspect of the means, methods, techniques, sequences or procedures of construction unless such advice or directions are specifically required by the Contract Documents.

5) Shall not advise on, issue directions regarding or assume control over safety precautions and programs in connection with the Work.

6) Shall not accept Shop Drawing or sample submittals from anyone other than Contractor.

9.3.8 The Architect/Engineer and or Owner shall have the authority to reject any work, or materials, or any part thereof, which does not in his opinion conform to the plans, drawings, specifications and contract, and it shall be permissible for him to do so at any time during the progress of the work and until its acceptance.

No material of any kind shall be used upon the work until it has been inspected and accepted by the Architect/Engineer. All materials rejected shall be removed immediately from the work and not again offered for inspection. Any materials or workmanship found at any time to be defective or not of the quality or character required by the plans and specifications shall be remedied at once regardless of previous inspection.

Such inspection shall not relieve the Contractor from any obligation to perform said work strictly in accordance with the plans and specifications and work not so constructed shall be removed and made good by the Contractor at his own expense, and free from all expense to the Owner whenever so ordered by the Owner without reference to any previous oversight or error in inspection.

9.4. Clarifications and Interpretations:

Architect/Engineer will issue with reasonable promptness such written clarifications or interpretations of the requirements of the Contract Documents (in the form of Drawings or otherwise) as Architect/Engineer may determine necessary, which shall be consistent with the intent of and reasonably inferable from Contract Documents. Such written clarifications and

interpretations will be binding on Owner and Contractor. If Owner or Contractor believes that a written clarification or interpretation justifies an adjustment in the Contract Price or the Contract Times and the parties are unable to agree to the amount or extent thereof, if any, Owner or Contractor may make a written claim therefore as provided in Article 11 or Article 12.

9.5. Authorized Variations in Work:

Architect/Engineer may authorize minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Times and are compatible with the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. These may be accomplished by a Field Order and will be binding on Owner and also on Contractor who shall perform the Work involved promptly. If Owner or Contractor believes that a Field Order justifies an adjustment in the Contract Price or the Contract Times and the parties are unable to agree as to the amount or extent thereof, Owner or Contractor may make a written claim therefore as provided in Article 11 or 12.

9.6. Rejecting Defective Work:

Architect/Engineer will have authority to disapprove or reject Work which Architect/Engineer believes to be defective, or that Architect/Engineer believes will not produce a complete Project that conforms to the Contract Documents or that will prejudice the integrity of the design concept of the completed Project as a functioning whole as indicated by the Contract Documents. Architect/Engineer will also have authority to require special inspection or testing of the Work as provided in paragraph 13.9, whether or not the Work is fabricated, installed or completed.

9.7. Shop Drawings, Change Orders and Payments:

9.7.1 In connection with Architect/Engineer's authority as to Shop Drawings and Samples, see paragraphs 6.19 through 6.20.4 inclusive.

9.7.2. In connection with Architect/Engineer's authority as to Change Orders, see Articles 10, 11, and 12.

9.7.3. In connection with Architect/Engineer's authority as to Applications for Payment, see Article 14.

9.8. Determinations for Unit Prices:

Architect/Engineer will determine the actual quantities and classifications of Unit Price Work performed by Contractor. Architect/Engineer will review with Contractor the Architect/Engineer's preliminary determinations on such matters before rendering a written decision thereon (by recommendation of an Application for Payment or otherwise). Architect/Engineer's written decision thereon will be final and binding upon Owner and Contractor, unless, within ten days after the date of any such decision, either Owner or Contractor delivers to the other and to Architect/Engineer written notice of intention to appeal from Architect/Engineer's decision and, a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction to exercise such rights or remedies as the appealing party may have with respect to Architect/Engineer's decision, unless otherwise agreed in writing by Owner and Contractor. Such appeal will not be subject to procedures of paragraph 9.9.

9.9. Decisions on Disputes:

9.9.1. Architect/Engineer will be the initial interpreter of the requirements of the Contract Documents and judge of the acceptability of the Work there under. Claims, disputes and other matters relating to the acceptability of the Work or the interpretation of the requirements of the Contract Documents pertaining to the performance and furnishing of the Work and Claims under Articles 11 and 12 in respect of changes in the Contract Price or Contract Times will be referred initially to Architect/Engineer in writing with a request for a formal decision in accordance with this paragraph. Written notice of each such claim, dispute or other matter will be delivered by the claimant to Architect/Engineer and the other party to the Agreement promptly, but in no event later than fifteen (15) days, after the start of the occurrence or event giving rise thereto, and written supporting data will be submitted to Architect/Engineer and the other party within forty-five (45) days after the start of such occurrence or event unless Architect/Engineer allows an additional period of time for the submission of additional or more accurate data in support of such claim, dispute or other matter. The opposing party shall submit any response to Architect/Engineer and the claimant within thirty days after receipt of the claimant's last submittal (unless Architect/Engineer allows additional time). Architect/Engineer will render a formal decision in writing within thirty days after receipt of the opposing party's submittal, if any, in accordance with this paragraph. Architect/Engineer's written decision on such claim, dispute or other matter will be final and binding upon Owner and Contractor unless: a written notice of intention to appeal from Architect/Engineer's written decision is delivered by Owner or Contractor to the other and to Architect/Engineer within thirty days after the date of such decision and a formal proceeding is instituted by the appealing party in a forum of competent jurisdiction to exercise such rights or remedies as the appealing party may have with respect to such claim, dispute or other matter in accordance with applicable Laws and Regulations within sixty days of the date of such decision, unless otherwise agreed in writing by Owner and Contractor.

9.9.2. When functioning as interpreter and judge under paragraph 9.9.1, Architect/Engineer will not show partiality to Owner or Contractor and will not be liable in connection with any interpretation or decision rendered in good faith in such capacity. The rendering of a decision by Architect/Engineer pursuant to paragraphs 9.8 or 9.9 with respect to any such claim, dispute or other matter (except any which have been waived by the making or acceptance of final payment as provided in paragraph 14.15) will be a condition precedent to any exercise by Owner or Contractor of such rights or remedies as either may otherwise have under the Contract Documents or by Laws or Regulations in respect of any such claim, dispute or other matter.

9.10. Not Used

9.11. Not Used

9.12. Not Used

9.13. Limitations on Architect/Engineer's Authority and Responsibilities:

9.13.1. Neither Architect/Engineer's authority or responsibility under this Article 9 or under any other provision of the Contract Documents nor any decision made by Architect/Engineer in good faith either to exercise or not exercise such authority or responsibility or the undertaking, exercise or performance of any authority or responsibility by Architect/Engineer shall create, impose or

give rise to any duty owed by Architect/Engineer to Contractor, any Subcontractor, and Supplier, any other person or organization, or to any surety for employee or agent of any of them.

9.13.2. Architect/Engineer will not supervise, direct, control or have authority over or be responsible for Contractor's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the furnishing or performance of the Work. Architect/Engineer will not be responsible for Contractor's failure to perform or furnish the Work in accordance with the Contract Documents.

9.13.3. Architect/Engineer will not be responsible for the acts or omissions of Contractor or of any Subcontractor, any Supplier, or of any other person or organization performing or furnishing any of the Work.

9.13.4. Architect/Engineer's review of the final Application for Payment and accompanying documentation and all maintenance and operating instructions, schedules, guarantees, bonds and certificates of inspection, tests, and approvals and Other documentation required to be delivered by paragraph 14.12 will only be to determine generally that their content complies with the requirements of, and in the case of, certificates of inspections, tests and approvals that the results certified indicate compliance with the Contracted Documents.

9.13.5. the limitations upon authority and responsibility set forth in this paragraph 9.13 shall also apply to Architect/Engineer's Consultants, Resident Project Representative and assistants.

ARTICLE 10 – CHANGES IN THE WORK

10.1. Without invalidating the Agreement and without notice to any surety, Owner may, at any time or from time to time, order additions, deletions or revisions in the Work. Such additions, deletions or revisions will be authorized by a Written Amendment, a Change Order, or a Work Change Directive. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided).

10.2. If Owner and Contractor are unable to agree as to the extent, if any, of an adjustment in the Contract Price or an adjustment of the Contract Times that should be allowed as a result of a Work Change Directive, a claim may be made therefore as provided in Article 11 or Article 12.

10.3. Contractor shall not be entitled to an increase in the Contract Price or an extension of the Contract Times with respect to any Work performed that is not required by the Contract Documents as amended, modified and supplemented as provided in paragraphs 3.5 and 3.6 except in the case of an emergency as provided in paragraph 6.23 or in the case of uncovering Work as provided in paragraph 13.9.

10.4. Owner and Contractor shall execute appropriate Change Orders recommended by Architect/Engineer covering:

10.4.1. changes in the Work which are (i) ordered by Owner pursuant to paragraph 10.1, (ii) required because of acceptance of defective Work under paragraph 13.13 or correcting defective Work under paragraph 13.14, or (iii) agreed to by the parties;

10.4.2. changes in the Contract Price or Contract Times which are agreed to by the parties; and

10.4.3. changes in the Contract Price or Contract Times which embody the substance of any written decision rendered by Architect/Engineer pursuant to paragraph 9.9;

Provided that, in lieu of executing any such Change Order, an appeal may be taken from any such decision in accordance with the provisions of the Contract Documents and applicable Laws and Regulations, but during any such appeal, Contractor shall carry on the Work and adhere to the progress schedule as provided in paragraph 6.21.

10.5. If notice of any change affecting the general scope of the Work or the provisions of the Contract Documents (including, but not limited to, Contract Price or Contract Times) is required by the provisions of any Bond to be given to a surety, the giving of any such notice will be Contractor's responsibility, and the amount of each applicable Bond will be adjusted accordingly.

ARTICLE 11 – CHANGE OF CONTRACT PRICE

11.1. The Contract Price constitutes the total compensation (subject to authorized adjustments) payable to Contractor for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by Contractor shall be at Contractor's expense without change in the Contract Price.

11.2. The Contract Price may only be changed by a Change Order. Any claim for an adjustment in the Contract Price shall be based on written notice delivered by the party making the claim to the other party and to Architect/Engineer promptly (but in no event later than ten days) after the start of the occurrence or event giving rise to the claim and stating the general nature of the claim. Notice of the amount of the claim with supporting data shall be delivered within thirty days after the start of such occurrence or event (unless Architect/Engineer allows additional time for claimant to submit additional or more accurate data in support of the claim) and shall be accompanied by claimant's written statement that the adjustment claimed covers all known amounts to which the claimant is entitled as a result of said occurrence or event. All claims for adjustment in the Contract Price shall be determined by Architect/Engineer in accordance with paragraph 9.8 if Owner and Contractor cannot otherwise agree on the amount involved. No claim for an adjustment in the Contract Price will be valid if not submitted in accordance with this paragraph 11.2.

11.3 The value of any Work covered by a Change Order or of any claim for an adjustment in the Contract Price will be determined as follows:

11.3.1. where the Work involved is covered by unit prices contained in the Contract Documents, by application of such unit prices to the quantities of the items involved (subject to the provisions of paragraphs 11.9.1. through 11.9.3. inclusive);

11.3.2. where the Work involved is not covered by unit prices contained in the Contract Documents, by a mutually agreed lump sum (which may include an allowance for overhead and profit not necessarily in accordance with paragraph 11.6.2):

11.3.3. where the Work involved is not covered by unit prices contained in the Contract Documents and agreement to a lump sum is not reached under paragraph 11.3.2, on the basis

of the Cost of the Work (determined as provided in paragraphs 11.4 and 11.5) plus a Contractor's fee for overhead and profit (determined as provided in paragraph 11.6).

Cost of the Work Covered by a Change Order:

11.4. The term Cost of the Work means the sum of all costs necessarily incurred and paid by Contractor in the proper performance of the Work. Except as otherwise may be agreed to in writing by Owner, such costs shall be in amounts no higher than those prevailing in the locality of the Project, shall include only the following items and shall not include any of the costs itemized in paragraph 11.5.

11.4.1. Payroll costs for employees in the direct employ of Contractor in the performance of the Work under schedules of job classifications agreed upon by Owner and Contractor. Such employees shall include without limitation superintendents, foremen and other personnel employed full-time at the site. Payroll costs for employees not employed full-time on the Work shall be apportioned on the basis of their time spent on the Work. Payroll costs shall include, but not be limited to, salaries and wages plus the cost of fringe benefits which shall include social security contributions, unemployment, excise and payroll taxes, workers' compensation, health and retirement benefits, bonuses, sick leave, vacation and holiday pay applicable thereto. The expenses of performing Work after regular working hours, on Saturday, Sunday or legal holidays, shall be included in the above to the extent authorized by Owner.

11.4.2. Cost of all materials and equipment furnished and incorporated in the Work, including costs of transportation and storage thereof, and Suppliers' field services required in connection therewith. All cash discounts shall accrue to Contractor unless Owner deposits funds with Contractor with which to make payments, in which case the cash discounts shall accrue to Owner. All trade discounts, rebates and refunds and returns from sale of surplus materials and equipment shall accrue to Owner, and Contractor shall make provisions so that they may be obtained.

11.4.3. Payments made by Contractor to the Subcontractors for Work performed or furnished by Subcontractors. If required by Owner, Contractor shall obtain competitive bids from subcontractors acceptable to Owner and Contractor and shall deliver such bids to Owner who will then determine, with the advice of Architect/Engineer, which bids, if any, will be accepted. If any subcontract provides that the Subcontractor is to be paid on the basis of Cost of the Work Plus a fee, the Subcontractor's Cost of the Work and fee shall be determined in the same manner as Contractor's Cost of the Work and fee as provided in paragraphs 11.4, 11.5, 11.6 and 11.7. All subcontracts shall be subject to the other provisions of the Contract Documents insofar as applicable.

11.4.4. Costs of special consultants (including but not limited to Architect/Engineers, architects, testing laboratories, surveyors, attorneys and accountants) employed for services specifically related to the Work.

11.4.5. Supplemental costs including the following:

11.4.5.1. The proportion of necessary transportation, travel and subsistence expenses of Contractor's employees incurred in discharge of duties connected with the Work.

11.4.5.2. Cost, including transportation and maintenance, of all materials, supplies, equipment, machinery, appliances, office and temporary facilities at the site and hand tools not

owned by the workers, which are consumed in the performance of the Work, and cost less market value of such items used but not consumed which remain the property of Contractor.

11.4.5.3. Rentals of all construction equipment and machinery and the parts thereof whether rented from Contractor or others in accordance with rental agreements approved by Owner with the advice of Architect/Engineer, and the costs of transportation, loading, unloading, installation, dismantling and removal thereof – all in accordance with the terms of said rental agreements. The rental of any such equipment, machinery or parts shall cease when the use thereof is no longer necessary for the Work.

11.4.5.4. Sales, consumer, use or similar taxes related to the work, and for which Contractor is liable, imposed by Laws and Regulations.

11.4.5.5. Deposits lost for causes other than negligence of Contractor, any Subcontractor or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, and royalty payments and fees for permits and licenses.

11.4.5.6. Losses and damages (and related expenses) caused by damage to the Work, not compensated by insurance or otherwise, sustained by Contractor in connection with the performance and furnishing of the Work (except losses and damages within the deductible amounts of property insurance established by Owner in accordance with paragraph 5.9), provided they have resulted from causes other than the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable. Such losses shall include settlements made with the written consent and approval of Owner. No such losses, damages and expenses shall be included in the Cost of the Work for the purpose of determining Contractor's fee. If, however, any such loss or damage requires reconstruction and Contractor is placed in charge thereof, Contractor is placed in charge thereof, Contractor shall be paid for services a fee proportionate to that stated in paragraph 11.6.2.

11.4.5.7. The cost of utilities, fuel and sanitary facilities at the site.

11.4.5.8. Minor expenses such as telegrams, long distance telephone calls, telephone service at the site, expressage and similar petty cash items in connection with the Work.

11.4.5.9. Cost of premiums for additional Bonds and insurance required because of changes in the Work.

11.5. The term Cost of the Work Covered by a Change Order shall not include any of the following:

11.5.1. Payroll costs and other compensation of Contractor's officers, executives, principals (of partnership and sole proprietorships), general managers, Architect/Engineers, architects, estimators, attorneys, auditors, accountants, purchasing and contracting agents, expediters, timekeepers, clerks and other personnel employed by Contractor whether at the site or in Contractor's principal or a branch office for general administration of the Work and not specifically included in the agreed upon schedule of job classifications referred to in paragraph 11.4.1 or specifically covered by paragraph 11.4.4 – all of which are to be considered administrative costs covered by the Contractor's fee.

11.5.2. Expenses of Contractor's principal and branch offices other than Contractor's office at the site.

11.5.3. Any part of Contractor's capital expenses, including interest on Contractor's capital employed for the Work and charges against Contractor for delinquent payments.

11.5.4. Cost of premiums for all Bonds and for all insurance whether or not Contractor is required by the Contract Documents to purchase and maintain the same (except for the cost of premiums covered by subparagraph 11.4.5.9 above).

11.5.5. Costs due to the negligence of Contractor, any Subcontractor, or anyone directly or indirectly employed by any of them or for whose acts any of them may be liable, including but not limited to, the correction of defective Work, disposal of materials or equipment wrongly supplied and making good any damage to property.

Other overhead or general expense costs of any kind and the costs of any item not specifically and expressly included in paragraph 11.4.

11.6. The Contractor's fee allowed to Contractor for overhead and profit shall be determined as follows:

11.6.1. a mutually acceptable fixed fee; or

11.6.2. if a fixed fee is not agreed upon, then a fee based on the following percentages of the various portions of the Cost of the Work:

11.6.2.1. for costs incurred under paragraphs 11.4.1 and 11.4.2, the Contractor's fee shall be ten percent;

11.6.2.2. for costs incurred under paragraph 11.4.3, the Contractor's fee shall be five percent.

11.6.2.3. where one or more tiers of subcontracts are on the basis of Cost of the Work plus a fee and no fixed fee is agreed upon, the intent of paragraphs 11.4.1, 11.4.2, 11.4.3 and 11.6.2 is that the Subcontractor who actually performs or furnishes the Work, at whatever tier, will be paid a fee of ten percent of the costs incurred by such Subcontractor under paragraphs 11.4.1 and 11.4.2 and that any higher tier Subcontractor and Contractor will each be paid a fee of five percent of the amount paid to the next lower tier Subcontractor:

11.6.2.4. no fee shall be payable on the basis of costs itemized under paragraphs 11.4.4, 11.4.5 and 11.5;

11.6.2.5. the amount of credit to be allowed by Contractor to Owner for any change which results in a net decrease in cost will be the amount of the actual net decrease in cost plus a deduction in Contractor's fee by an amount equal to five percent of such net decrease; and

11.6.2.6. when both additions and credits are involved in any one change, the adjustment in Contractor's fee shall be computed on the basis of the net change in accordance with paragraphs 11.6.2.1 through 11.6.2.5, inclusive.

11.7. Whenever the cost of any work is to be determined pursuant to paragraphs 11.4 and 11.5, Contractor will establish and maintain records thereof in accordance with generally accepted accounting practices and submit in form acceptable to Architect/Engineer an itemized cost breakdown together with supporting data.

11.8. Not Used

11.9. Unit Price Work:

11.9.1. Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, initially the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the established unit price for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price. Determinations of the actual quantities and classifications of Unit Price Work performed by Contractor will be made by Architect/Engineer in accordance with paragraph 9.10.

11.9.2. Each unit price will be deemed to include an amount considered by Contractor to be adequate to cover Contractor's overhead and profit for each separately identified item.

11.9.3. Owner or Contractor may make a claim for an adjustment in the Contract Price in accordance with Article 11 if:

11.9.3.1. the quantity of any item of Unit Price Work performed by Contractor differs materially and significantly from the estimated quantity of such item indicated in the Agreement; and

11.9.3.2. there is no corresponding adjustment with respect to any other item of Work; and

11.9.3.3. if Contractor believes that Contractor is entitled to an increase in Contract Price as a result of having incurred additional expense or Owner believes that Owner is entitled to a decrease in Contract Price and the parties are unable to agree as to the amount of any such increase or decrease.

ARTICLE 12 – CHANGE OF CONTRACT TIMES

12.1. The Contract Times (or Milestones) may only be changed by a Change Order or a Written Amendment. Any claim for an adjustment of the Contract Times (or Milestones) shall be based on written notice delivered by the party making the claim to the other party and to Architect/Engineer promptly (but in no event later than thirty days) after the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the extent of the claim with supporting data shall be delivered within sixty days after such occurrence (unless Architect/Engineer allows an additional period of time to ascertain more accurate data in support of the claim) and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled as a result of the occurrence of said event. All claims for adjustment in the Contract Times (or Milestones) shall be determined by Architect/Engineer in accordance with paragraph 9.11 if Owner and Contractor cannot otherwise agree. No claim for an adjustment in the Contract Times

(or Milestones) will be valid if not submitted in accordance with the requirements of this paragraph 12.1.

12.2. All time limits stated in the Contract Documents are of the essence of the Agreement.

12.3. Where Contractor is prevented from completing any part of the Work within the Contract Times (or Milestones) due to delay beyond the control of Contractor, the Contract Times (or Milestones) will be extended in an amount equal to the time lost due to such delay if a claim is made therefore as provided in paragraph 12.1. Delays beyond the control of Contractor shall include, but not be limited to, acts or neglect by Owner, acts or neglect of utility owners or other contractors performing other work as contemplated by Article 7, fires, floods, epidemics, abnormal weather conditions or acts of God. Delays attributable to and within the control of a Subcontractor or Supplier shall be deemed to be delays within the control of Contractor.

12.4. Should Contractor be obstructed or delayed in the prosecution of or completion of the Work as a result of unforeseeable causes beyond the control of Contractor, and not due to its fault or neglect, including but not restricted to acts of God or of the public enemy, acts of government, fires, floods, epidemics, quarantine regulation, strikes or lockouts, Contractor shall notify the Owner in writing within forty-eight (48) hours after the commencement of such delay, stating the cause or causes thereof, or be deemed to have waived any right which Contractor may have had to request a time extension.

12.5. No interruption, interference, inefficiency, suspension or delay in the commencement or progress of the Work from any cause whatever, including those for which the Owner may be responsible, in whole or in part, shall relieve Contractor of his duty to perform or give rise to any right to damages or additional compensation from the Owner. Contractor expressly acknowledges and agrees that it shall receive no damages for delay. Contractor's sole remedy, if any, against the Owner will be the right to seek an extension to the Contract Time; provided, however, the granting of any such time extension shall not be a condition precedent to the aforementioned “No Damage For Delay” provision. This paragraph shall expressly apply to claims for early completion, as well as to claims based on late completion.

ARTICLE 13 – TESTS AND INSPECTION: CORRECTION, REMOVAL OR ACCEPTANCE OF DEFECTIVE WORK

13.1. **Notice of Defects:** Prompt notice of all defective Work of which Owner or Architect/Engineer have actual knowledge will be given to Contractor. All defective Work may be rejected, corrected or accepted as provided in this Article 13.

Access to Work:

13.2. Owner, Architect/Engineer, Architect/Engineer's Consultants, other representatives and personnel of Owner, independent testing laboratories and governmental agencies with jurisdictional interests will have access to the Work at reasonable times for their observation, inspecting and testing. Contractor shall provide them proper and safe conditions for such access and advise them of Contractor's site safety procedures and programs so that they may comply therewith as applicable.

Tests and Inspections:

13.3. Contractor shall give Architect/Engineer timely notice of readiness of the Work for all required inspections, tests or approvals, and shall cooperate with inspection and testing personnel to facilitate required inspections or tests.

13.4. Contractor shall employ and pay for services of an independent testing laboratory to perform all Quality Control inspections, test or approvals required by the contract documents. Contractor shall allow the Architect/Engineer access to all work done in the project for Acceptance Testing by the owner. This testing will be in addition to Quality Control Testing required by the Contractor. Owner shall arrange and pay all costs associated with Acceptance Testing done by an independent testing laboratory of the Owners choosing except:

13.4.1. for inspections, tests or approvals covered by paragraph 13.5 below.

13.4.2. that costs incurred in connection with tests or inspections conducted pursuant to paragraph 13.9 below shall be paid as provided in said paragraph 13.9; and

13.4.3. as otherwise specifically provided in the Contract Documents.

13.4.4 Owner shall perform the following test as part of quality assurance / acceptance testing:

All material testing included in the Bidding Documents.

All other required testing is to be completed by the contractor as part of the contractor's quality control procedures and submittals. This section shall take precedence over all other sections that describe testing requirements.

13.5. If Laws or Regulations of any public body having jurisdiction require any Work (or part thereof) specifically to be inspected, tested or approved by an employee or other representative of such public body, Contractor shall assume full responsibility for arranging and obtaining such inspections, tests or approvals, pay all costs in connection therewith, and furnish Architect/Engineer the required certificates of inspection, or approval. Contractor shall also be responsible for arranging and obtaining and shall pay all costs in connection with any inspections, tests or approvals required for Owner's and Architect/Engineer's acceptance of materials or equipment to be incorporated in the Work, or of materials, mix designs, or equipment submitted for approval prior to Contractor's purchase thereof for incorporation in the Work. Quality Control Testing of materials and equipment shall be the responsibility of the Contractor who shall pay all costs associated with the required testing. Contractor shall provide the Architect/Engineer adequate advance notice of intended tests to allow the Architect/Engineer to be present during the Testing.

13.6. If any Work (or the work of others) that is to be inspected, tested or approved is covered by Contractor without written concurrence of Architect/Engineer, it must, if requested by Architect/Engineer, be uncovered for observation.

13.7. Uncovering Work as provided in paragraph 13.6 shall be at Contractor's expense unless Contractor has given Architect/Engineer timely notice of Contractor's intention to cover the same and Architect/Engineer has not acted with reasonable promptness in response to such notice.

Uncovering Work:

13.8. If any Work is covered contrary to the written request of Architect/Engineer, it must, if requested by Architect/Engineer, be uncovered for Architect/Engineer's observation and replaced at Contractor's expense.

13.9. If Architect/Engineer considers it necessary or advisable that covered Work be observed by Architect/Engineer or inspected or tested by others, Contractor, at Architect/Engineer's request, shall uncover, expose or otherwise make available for observation, inspection or testing as Architect/Engineer may require that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is defective, Contractor shall pay all claims, costs, losses and damages caused by, arising out of or resulting from such uncovering, exposure, observation, inspection and testing and of satisfactory replacement or reconstruction (including but not limited to all costs of repair or replacement of work of others; and Owner shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, may make a claim therefore as provided in Article 11. If, however, such Work is not found to be defective, Contractor shall be allowed an increase in the Contract Price or an extension of the Contract Times (or Milestones), or both, directly attributable to such uncovering, exposure, observation, inspection, testing, replacement and reconstruction; and, if the parties are unable to agree as to the amount or extent therefore, Contractor may make a claim therefore as provided in Articles 11 and 12.

Owner May Stop the Work:

13.10. If the Work is defective, or Contractor fails to supply sufficient skilled workers or suitable materials or equipment, or fails to furnish or perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of Owner to stop the Work shall not give rise to any duty on the part of Owner to exercise this right for the benefit of Contractor or any surety or other party.

Correction or Removal of Defective Work:

13.11. If required by Architect/Engineer, Contractor shall promptly, as directed, either correct all defective Work, whether or not fabricated, installed or completed, or, if the Work has been rejected by Architect/Engineer, remove it from the site and replace it with Work that is not defective. Contractor shall pay all claims, costs, losses and damages caused by or resulting from such correction or removal (including but not limited to all costs of repair or replacement of work of others).

13.12. Correction Period:

13.12.1. If within one year after the date of Substantial Completion or such longer period of time as may be prescribed by Laws or Regulations or by the terms of any applicable special guarantee required by the Contract Documents or by any specific provision of the Contract Documents, any Work is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instruction: (i) correct such defective Work, or, if it has been rejected by Owner, remove it from the site and replace it with Work that is not defective, and (ii) satisfactorily correct or remove and replace any damage to other Work or the work of others resulting therefrom. If Contractor does not promptly comply with the terms of such instructions, or in any emergency where delay would cause serious risk of loss or damage, Owner may have the

defective Work corrected or the rejected Work removed and replaced, and all claims, costs, losses and damages caused by or resulting from such removal and replacement (including but not limited to all costs of repair or replacement of work of others) will be paid by Contractor.

13.12.2. In special circumstances where a particular item of equipment is placed in continuous service before Substantial Completion of all the Work, the correction period for that item may start to run from an earlier date if so provided in the Specifications or by Written Amendment.

13.12.3. Where defective Work (and damage to other Work resulting therefrom) has been corrected, removed or replaced under this paragraph 13.12, the correction period hereunder with respect to such Work will be extended for an additional period of one year after such correction or removal and replacement has been satisfactorily completed.

13.13. Acceptance of Defective Work:

If, instead of requiring correction or removal and replacement of defective Work, Owner (and, prior to Architect/Engineer's recommendation of final payment, also Architect/Engineer) prefers to accept it, Owner may do so. Contractor shall pay all claims, costs, losses and damages attributable to Owner's evaluation of and determination to accept such defective Work (such costs to be approved by Architect/Engineer as to reasonableness). If any such acceptance occurs prior to Architect/Engineer's recommendation of final payment, a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, Owner may make a claim therefore as provided in Article 11. If the acceptance occurs after such recommendation, an appropriate amount will be paid by Contractor to Owner.

13.14. Owner May Correct Defective Work:

If Contractor fails within a reasonable time after written notice from Architect/Engineer to correct defective Work or to remove and replace rejected Work as required by Architect/Engineer in accordance with paragraph 13.11, or if Contractor fails to perform the Work in accordance with the Contract Documents, or if Contractor fails to comply with any other provision of the Contract Documents, Owner may, after seven days' written notice to Contractor, correct and remedy any such deficiency. In exercising the rights and remedies under this paragraph Owner shall proceed expeditiously. In connection with such corrective and remedial action, Owner may exclude Contractor from all or part of the site, take possession of all or part of the Work, and suspend Contractor's services related thereto, take possession of Contractor's tools, appliances, construction equipment and machinery at the site and incorporate in the Work all materials and equipment stored at the site or for which Owner has paid Contractor but which are stored elsewhere. Contractor shall allow Owner, Owner's representative, agents and employees, Owner's other contractors and Architect/Engineer and Architect/Engineer's Consultants access to the site to enable Owner to exercise the rights and remedies under this paragraph. All claims, costs, losses and damages incurred or sustained by Owner in exercising such rights and remedies will be charged against Contractor and a Change Order will be issued incorporating the necessary revisions in the Contract Documents with respect to the Work; and Owner shall be entitled to an appropriate decrease in the Contract Price, and, if the parties are unable to agree as to the amount thereof, Owner may make a claim therefore as provided in Article 11. Such claims, costs, losses and damages will include but not be limited to all costs of repair or replacement of work of others destroyed or damaged by correction, removal or replacement of

Contractor's defective Work. Contractor shall not be allowed an extension of the Contract Times (or Milestones) because of any delay in the performance of the Work attributable to the exercise by Owner of Owner's rights and remedies hereunder.

ARTICLE 14 – PAYMENTS TO CONTRACTOR AND COMPLETION

Schedule of Values:

14.1. The schedule of values established as provided in paragraph 2.9 will serve as the basis for progress payments and will be incorporated into a form of Application for Payment acceptable to Architect/Engineer. Progress payments on account of Unit Price Work will be based on the number of units completed.

Application for Progress Payment:

14.2. At least ten days before the date established for each progress payment (but not more often than once a month), Contractor shall submit to Architect/Engineer for review an Application for Payment filled out and signed by Contractor covering the Work completed as of the date of the Application and accompanied by such supporting documentation as is required by the Contract Documents. If payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the site or at another location agreed to in writing, the Application for Payment shall also be accompanied by a bill of sale, invoice or other documentation warranting that Owner has received the materials and equipment free and clear of all Liens and evidence that the materials and equipment are covered by appropriate property insurance and other arrangements to protect Owner's interest therein, all of which will be satisfactory to Owner. The amount of retainage with respect to progress payments will be as stipulated in the Agreement.

Contractor's Warranty of Title:

14.3. Contractor warrants and guarantees that title to all Work, materials and equipment covered by any Application for Payment, whether incorporated in the Project or not, will pass to Owner no later than the time of payment free and clear of all Liens.

Review of Applications for Progress Payment:

14.4. Architect/Engineer will, within *fifteen (15)* days after receipt of each Application for Payment, either indicate in writing a recommendation of payment and present the Application to Owner, or return the Application to Contractor indicating in writing Architect/Engineer's reasons for refusing to recommend payment. In the latter case, Contractor may make the necessary corrections and resubmit the Application. *Thirty (30)* days after presentation of the Application for Payment to Owner with Architect/Engineer's recommendation, the amount recommended will (subject to the provisions of the last sentence of paragraph 14.7) become due and when due will be paid by Owner to Contractor.

14.5. Architect/Engineer's recommendation of any payment requested in an Application for Payment will constitute a representation by Architect/Engineer to Owner, based on Architect/Engineer's on-site observations of the executed Work as an experienced and qualified design professional and on Architect/Engineer's review of the Application for Payment and the

accompanying data and schedules, that to the best of Architect/Engineer's knowledge, information and belief:

14.5.1. the Work has progressed to the point indicated.

14.5.2. the quality of the Work is generally in accordance with the Contract Documents (subject to an evaluation of the Work as a functioning whole prior to or upon Substantial Completion, to the results of any subsequent tests called for in the Contract Documents, to a final determination of quantities and classifications for Unit Price Work under paragraph 9.8, and to any other qualifications stated in the recommendation), and

14.5.3. the conditions precedent to Contractor's being entitled to such payment appear to have been fulfilled in so far as it is Architect/Engineer's responsibility to observe the Work.

However, by recommending any such payment Architect/Engineer will not thereby be deemed to have represented that: (i) exhaustive or continuous on-site inspections have been made to check the quality or the quantity of the Work beyond the responsibilities specifically assigned to Architect/Engineer in the Contract Documents or (ii) that there may not be other matters or issues between the parties that might entitle Contractor to be paid additionally by Owner or entitle Owner to withhold payment to Contractor.

14.6. Architect/Engineer's recommendation of any payment, including final payment, shall not mean that Architect/Engineer is responsible for Contractor's means, methods, techniques, sequences or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with Laws and Regulations applicable to the furnishing or performance of Work, or for any failure of Contractor to perform or furnish Work in accordance with the Contract Documents.

14.7. Architect/Engineer may refuse to recommend the whole or any part of any payment if, in Architect/Engineer's opinion, it would be incorrect to make the representations to Owner referred to in paragraph 14.5. Architect/Engineer may also refuse to recommend any such payment, or, because of subsequently discovered evidence or the results of subsequent inspections or tests, nullify any such payment previously recommended, to such extent as may be necessary in Architect/Engineer's opinion to protect Owner from loss because:

14.7.1. the Work is defective, or completed Work has been damaged requiring correction or replacement.

14.7.2. the Contract Price has been reduced by Written Amendment or Change Order.

14.7.3. Owner has been required to correct defective Work or complete Work in accordance with paragraph 13.14. or

14.7.4. Architect/Engineer has actual knowledge of the occurrence of any of the events enumerated in paragraphs 15.2.1 through 15.2.4 inclusive.

Owner may refuse to make payment of the full amount recommended by Architect/Engineer because:

14.7.5. claims have been made against Owner on account of Contractors performance or furnishing of the Work.

14.7.6. Liens have been filed in connection with the Work, except where Contractor has delivered a specific Bond satisfactory to Owner to secure the satisfaction and discharge of such Liens,

14.7.7. there are other items entitling Owner to a set-off against the amount recommended, or

14.7.8. Owner has actual knowledge of the occurrence of any of the events enumerated in paragraphs 14.7.1 through 14.7.3 or paragraphs 15.2.1 through 15.2.4 inclusive;

but Owner must give Contractor immediate written notice (with a copy to Architect/Engineer) stating the reasons for such action and promptly pay Contractor the amount so withheld, or any adjustment thereto agreed to by Owner and Contractor, when Contractor corrects to Owner's satisfaction the reasons for such action.

Substantial Completion:

14.8. When Contractor considers the entire Work ready for its intended use Contractor shall notify Owner and Architect/Engineer in writing that the entire Work is substantially complete (except for items specifically listed by Contractor as incomplete) and request that Architect/Engineer issue a certificate of Substantial Completion. Within a reasonable time thereafter, Owner, Contractor and Architect/Engineer shall make an inspection of the Work to determine the status of completion. If Architect/Engineer does not consider the Work substantially complete, Architect/Engineer will notify Contractor in writing giving the reasons therefore. If Architect/Engineer considers the Work substantially complete, Architect/Engineer will prepare and deliver to Owner a tentative certificate of Substantial Completion which shall fix the date of Substantial Completion. There shall be attached to the certificate a tentative list of items to be completed or corrected before final payment. Owner shall have seven days after receipt of the tentative certificate during which to make written objection to Architect/Engineer as to any provisions of the certificate or attached list. If, after considering such objections, Architect/Engineer concludes that the Work is not substantially complete, Architect/Engineer will within fourteen days after submission of the tentative certificate to Owner notify Contractor in writing, stating the reasons therefore. If, after consideration of Owner's objections, Architect/Engineer considers the Work substantially complete, Architect/Engineer will within said fourteen days execute and deliver to Owner and Contractor a definitive certificate of Substantial Completion (with a revised tentative list of items to be completed or corrected) reflecting such changes from the tentative certificate as Architect/Engineer believes justified after consideration of any objections from Owner. At the time of delivery of the tentative certificate of Substantial Completion Architect/Engineer will deliver to Owner and Contractor a written recommendation as to division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, maintenance, heat, utilities, insurance and warranties and guarantees. Unless Owner and Contractor agree otherwise in writing and so inform Architect/Engineer in writing prior to Architect/Engineer's issuing the definitive certificate of Substantial Completion, Architect/Engineer's aforesaid recommendation will be binding on Owner and Contractor until final payment.

14.9. Owner shall have the right to exclude Contractor from the Work after the date of Substantial Completion, but Owner shall allow Contractor reasonable access to complete or correct items on the tentative list.

Partial Utilization:

14.10. Use by Owner at Owner's option of any substantially completed part of the Work which: (i) has specifically been identified in the Contract Documents, or (ii) Owner, Architect/Engineer and Contractor agree constitutes a separately functioning and usable part of the Work that can be used by Owner for its intended purpose without significant interference with Contractor's performance of the remainder of the Work, may be accomplished prior to Substantial Completion of all the Work subject to the following:

14.10.1. Owner at any time may request Contractor in writing to permit Owner to use any such part of the Work which Owner believes to be ready for its intended use and substantially complete. If Contractor agrees that such part of the Work is substantially complete, Contractor will certify to Owner and Architect/Engineer that such part of the Work is substantially complete and request Architect/Engineer to issue a certificate of Substantial Completion for that part of the Work. Contractor at any time may notify Owner and Architect/Engineer in writing that Contractor considers any such part of the Work ready for its intended use and substantially complete and request Architect/Engineer to issue a certificate of Substantial Completion for that part of the Work. Within a reasonable time after either such request, Owner, Contractor and Architect/Engineer shall make an inspection of that part of the Work to determine its status of completion. If Architect/Engineer does not consider that part of the Work to be substantially complete, Architect/Engineer will notify Owner and Contractor in writing giving the reasons therefore. If Architect/Engineer considers that part of the Work to be substantially complete, the provisions of paragraphs 14.8 and 14.9 will apply with respect to certification of Substantial Completion of that part of the Work and the division of responsibility in respect thereof and access thereto.

14.10.2. No occupancy or separate operation of part of the Work will be accomplished prior to compliance with the requirements of paragraph 5.6 in respect of property insurance.

Owner may at any time request Contractor in writing to permit Owner to take over operation of any such part of the work although it is not substantially complete. A copy of such request will be sent to Architect/Engineer and within a reasonable time thereafter Owner, Contractor, and Architect/Engineer shall make an inspection of that part of the Work to determine its status of completion and will prepare a list of the items remaining to be completed or corrected thereon before final payment. If Contractor does not object in writing to Owner and Architect/Engineer that such part of the Work is not ready for separate operation by Owner, Architect/Engineer will finalize the list if items to be completed or corrected and will deliver such lists to Owner and Contractor together with a written recommendation as to the division of responsibilities pending final payment between Owner and Contractor with respect to security, operation, safety, maintenance, utilities, insurance, warranties and guarantees for that part of the Work which will become binding upon Owner and Contractor at the time when Owner takes over such operation (unless they shall have otherwise agreed in writing and so informed Architect/Engineer). During such operation and prior to Substantial Completion of such part of the Work, Owner shall allow Contractor reasonable access to complete or correct items on said list and to complete other related Work.

Final Inspection:

14.11. Upon written notice from Contractor that the entire Work or an agreed portion thereof is complete, Architect/Engineer will make a final inspection with Owner and Contractor and will notify Contractor in writing of all particulars in which this inspection reveals that the Work is incomplete or defective. Contractor shall immediately take such measures as are necessary to complete such Work or remedy such deficiencies.

Final Application for Payment:

14.12. After Contractor has completed all such corrections to the satisfaction of Architect/Engineer and delivered in accordance with the Contract Documents all maintenance and operating instructions, schedules, guarantees, Bonds, certificates or other evidence of insurance required by paragraph 5.4, certificates of inspection, marked-up record documents (as provided in paragraph 6.14) and other documents, Contractor may make application for final payment following the procedure for progress payments. The final Application for Payment shall be accompanied (except as previously delivered) by:

(i) consent of the surety, if any, to final payment.

(ii) complete and legally effective releases or waivers (satisfactory to Owner) of all Liens arising out of or filed in connection with the Work. In lieu of such releases or waivers of Liens and as approved by Owner, Contractor may furnish receipts or releases in full and an affidavit of Contractor that: (i) the releases and receipts include all labor, services, material and equipment for which a Lien could be filed, and (ii) all payrolls, material and equipment bills and other indebtedness connected with the Work for which Owner or Owner's property might in any way be responsible have been paid or otherwise satisfied. If any Subcontractor or Supplier fails to furnish such a release or receipt in full, Contractor may furnish a Bond or other collateral satisfactory to Owner to indemnify Owner against any Lien.

(iii) certification from surety that payment and performance bond shall remain in effect one (1) year following final payment.

(iv) contractor’s advertisement of completion – advertisement for a period of four (4) successive weeks in the newspaper or largest circulation published within the county where the work is performed.

(v) certification from insurance company that any insurance coverage written on a claims-made basis, remain in effect for at least two (2) years following final payment.

Final Payment and Acceptance:

14.13. If, on the basis of Architect/Engineer's observation of the Work during construction and final inspection, and Architect/Engineer's review of the final application for Payment and accompanying documentation as required by the Contract Documents, Architect/Engineer is satisfied that the Work has been completed and Contractor's other obligations under the Contract Documents have been fulfilled, Architect/Engineer will, within ten days after receipt of the final Application for Payment, indicate in writing Architect/Engineer's recommendation of payment and present the Application to Owner for payment. At the same time Architect/Engineer will also give written notice to Owner and Contractor that the Work is acceptable subject to the provisions of paragraph 14.15 Otherwise, Architect/Engineer will return the Application to Contractor,

indicating in writing the reasons for refusing to recommend final payment, in which case Contractor shall make the necessary corrections and resubmit the Application. Thirty days after the presentation to Owner of the Application and accompanying documentation, in appropriate form and substance and with Architect/Engineer's recommendation and notice of acceptability, the amount recommended by Architect/Engineer will become due and will be paid by Owner to Contractor

14.14. If, through no fault of Contractor, final completion of the Work is significantly delayed and if Architect/Engineer so confirms, Owner shall, upon receipt of Contractor's final Application for Payment and recommendation of Architect/Engineer, and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance to be held by Owner for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if Bonds have been furnished as required in paragraph 5.1, the written consent of the surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by Contractor to Architect/Engineer with the Application for such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.

Waiver of Claims:

14.15. The making and acceptance of final payment will constitute:

14.15.1. a waiver of all claims by Owner against Contractor, except claims arising from unsettled Liens, from defective Work appearing after final inspection pursuant to paragraph 14.11, from failure to comply with the Contract Documents or the terms of any special guarantees specified therein, or from Contractor's continuing obligations under the Contract Documents; and

14.15.12. a waiver of all claims by Contractor against Owner other than those previously made in writing and still unsettled.

ARTICLE 15 – SUSPENSION OF WORK AND TERMINATION

Owner May Suspend Work:

15.1. At any time and without cause, Owner may suspend the Work or any portion thereof for a period of not more than ninety days by notice in writing to Contractor and Architect/Engineer which will fix the date on which Work will be resumed. Contractor shall resume the Work on the date so fixed. Contractor shall be allowed an adjustment in the Contract Price or an extension of the Contract Times, or both, directly attributable to any such suspension if Contractor makes an approved claim therefore as provided in Articles 11 and 12.

Owner May Terminate:

15.2. Upon the occurrence of any one or more of the following events:

15.2.1. if Contractor persistently fails to perform the Work in accordance with the Contract Documents (including, but not limited to, failure to supply sufficient skilled workers or suitable materials or equipment or failure to adhere to the progress schedule established under paragraph 2.9 as adjusted from time to time pursuant to paragraph 6.6);

15.2.2. if Contractor disregards Laws or Regulations of any public body having jurisdiction;

15.2.3. if Contractor disregards the authority of Architect/Engineer; or

15.2.4. if Contractor otherwise violates in any substantial way any provisions of the Contract Documents;

15.2.5 if Contractor commences a voluntary case under any chapter of the Bankruptcy Code (Title 11, United States Code), as now or hereafter in effect, or if Contractor takes any equivalent or similar action by filing a petition or otherwise under any other federal or state law in effect at such time relating to the bankruptcy or insolvency;

15.2.5.1 if a petition is filed against Contractor under any chapter of the Bankruptcy Code (Title 11, United States Code), as now or hereafter in effect at the time of filing, or if a petition is filed seeking any such equivalent or similar relief against Contractor under any other federal or state law in effect at the time relating to bankruptcy or insolvency;

15.2.5.2 if Contractor makes a general assignment for the benefit of creditors;

15.2.5.3 if a trustee, receiver, custodian, or agent of Contractor is appointed under applicable law or under contract, whose appointment or authority to take charge of property of Contractor is for the purpose of enforcing a Lien against such property or for the purpose of general administration of such property for the benefit of Contractor's creditors;

15.2.5.4 if Contractor admits in writing an inability to pay its debts generally as they become due.

Owner may, after giving Contractor (and the surety, if any,) seven days' written notice and to the extent permitted by Laws and Regulations, terminate the services of Contractor, exclude Contractor from the site and take possession of the Work and of all Contractor's tools, appliances, construction equipment and machinery at the site and use the same to the full extent they could be used by Contractor (without liability to Contractor for trespass or conversion), incorporate in the Work all materials and equipment stored at the site or for which Owner has paid Contractor but which are stored elsewhere, and finish the Work as Owner may deem expedient. In such case Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds all claims, costs, losses and damages sustained by Owner arising out of or resulting from completing the Work such excess will be paid to Contractor. If such claims, costs, losses and damages exceed such unpaid balance, Contractor shall pay the difference to Owner. Such claims, costs, losses and damages incurred by Owner will be reviewed by Architect/Engineer as to their reasonableness and when so approved by Architect/Engineer incorporated in a Change Order, provided that when exercising any rights or remedies under this paragraph Owner shall not be required to obtain the lowest price for the Work performed.

15.3. Where Contractor's services have been so terminated by Owner, the termination will not affect any rights or remedies of Owner against Contractor then existing or which may thereafter accrue. Any retention or payment of moneys due Contractor by Owner will not release Contractor from liability.

15.4. Upon seven days' written notice to Contractor and Architect/Engineer, Owner may, without cause and without prejudice to any other right or remedy of Owner, elect to terminate the Agreement. In such case, Contractor shall be paid (without duplication of any items):

15.4.1. for completed and acceptable Work executed in accordance with the Contract Documents prior to the effective date of termination, including fair and reasonable sums for overhead and profit on such Work;

15.4.2. for expenses sustained prior to the effective date of termination in performing services and furnishing labor, materials or equipment as required by the Contract Documents in connection with uncompleted Work, plus fair and reasonable sums for overhead and profit on such expenses;

15.4.3. for all claims, costs, losses and damages incurred in settlement of terminated contracts with Subcontractors, Suppliers and other; and

15.4.4. for reasonable expenses directly attributable to termination.

Contractor shall not be paid on account of loss of anticipated profits or revenue or other economic loss arising out of or resulting from such termination.

Contractor May Stop Work or Terminate:

15.5. If, through no act or fault of Contractor, the Work is suspended for a period of more than ninety days by Owner or under an order of court or other public authority, or Architect/Engineer fails to act on any Application for Payment within thirty days after it is submitted or Owner fails for thirty days to pay Contractor any sum finally determined to be due, then Contractor may, upon seven days' written notice to Owner and Architect/Engineer, and provided Owner or Architect/Engineer do not remedy such suspension or failure within that time, terminate the Agreement and recover from Owner payment on the same terms as provided in paragraph 15.4. In lieu of terminating the Agreement and without prejudice to any other right or remedy, if Architect/Engineer has failed to act on an Application for Payment within thirty days after it is submitted, or Owner has failed for thirty days to pay Contractor any sum finally determined to be due, Contractor may upon seven day's written notice to Owner and Architect/Engineer stop the Work until payment of all such amounts due Contractor, including interest thereon. The provisions of this paragraph 15.5 are not intended to preclude Contractor from making claim under Articles 11 and 12 for an increase in Contract Price or Contract Times or otherwise for expenses or damage directly attributable to Contractor's stopping Work as permitted by this paragraph.

ARTICLE 16 – MISCELLANEOUS

16.1 Giving Notice:

Whenever any provision of the Contract Documents requires the giving of written notice, it will be deemed to have been validly given if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered or certified mail, postage prepaid, to the last business address known to the giver of the notice.

16.2 Computation of Times:

16.2.1. When any period of time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

16.2.2. A calendar day of twenty-four hours measured from midnight to the next midnight will constitute a day.

16.3. Notice of Claim:

Should Owner or Contractor suffer injury or damage to person or property because of any error, omission or act of the other part or of any of the other party's employees or agents or others for whose acts the other party is legally liable, claim will be made in writing to the other party promptly, but in no event later than fifteen (15) days of the first observance of such injury or damage. The provisions of this paragraph 16.3 shall not be construed as a substitute for or a waiver of the provisions of any applicable statute of limitations or repose.

16.4. Cumulative Remedies:

The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder to the parties hereto, and, in particular but without limitation, the warranties, guarantees and obligations imposed upon Contractor by paragraphs 6.2, 6.13, 6.22, 6.23, 13.1, 13.12, 13.14, 14.3 and 15.2 and all of the rights and remedies available to Owner and Architect/Engineer thereunder, are in addition to, and are not to be construed in any way as a limitation of, any rights and remedies available to any or all of them which are otherwise imposed or available by Laws or Regulations, by special warranty or guarantee or by other provisions of the Contract Documents, and the provisions of this paragraph will be as effective as if repeated specifically in the Contract Documents in connection with each particular duty, obligation, right and remedy to which they apply.

16.5. Professional Fees and Court Costs Included:

Whenever reference is made to "claims, costs, losses and damages," it shall include in each case, but not be limited to, all fees and charges of Architect/Engineers, architects, attorneys and other professionals and all court or other dispute resolution costs.

16.6. Labor Records and Schedules:

The Department of Jurisdiction on such public work shall require all Contractors and Subcontractors to keep the following records on the site of the public work project on which such Contractors, and Subcontractors are engaged:

16.6.1 Record of hours worked by each worker, laborer, and mechanic on each day.

16.6.2 Record of days worked each week by each worker, laborer, and mechanic.

16.6.3 Schedule of occupation or occupations at which each worker, laborer, and mechanic on the project is employed during each workday and week.

16.6.4 Schedule of hourly wage rates and supplements paid to each worker, laborer, and mechanic for each occupation.

16.7. Wage Schedules:

Pursuant to the Labor Law, each laborer, worker, or mechanic employed by the Contractor, Subcontractor, or other person shall be paid not less than the prevailing rate of wages for a legal day's work and shall be provided supplements not less than the prevailing supplements as determined by the Industrial Commissioner.

The Contractor and every Subcontractor shall post in a prominent and accessible place on the site of the work a legible statement of all wage rates and supplements as specified in the Contract to be paid or provided, as the case may be, for the various classes of mechanics, workers, and laborers employed on the work.

The Owner does not represent or warrant that the accompanying schedule of wage rates and supplements with the classification of workers, mechanics, and laborers, as required the Labor Law, is complete, and it reserves the right to revise such schedule when required. If any occupation is not mentioned in the schedule of wage rates and supplements it shall be requested from the Industrial Commissioner, by the Contractor through the Architect/Engineer and such schedules, shall, upon notice to the Contractor, become and be a part of the wage and supplement schedules embodied in the Contract.

Also included is the Federal Wage Rate Determination. Laborers, workmen, and mechanics employed on the work done in performance of said Contract shall be paid not less than the rate of wages listed thereon for the trade or occupation of such laborer, etc.

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SECTION 01 11 00 - SUMMARY OF WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Conditions/Provisions of Contract, including Contractual Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 PROJECT DESCRIPTION

A. Project/Work Identification:

1. The General overall description of the Work of the Contract for the:

   DESTIN-FORT WALTON BEACH AIRPORT
   ITB AP 21-21 Design OF SATELLITE CONCOURSE “C”
   Eglin AFB, Florida 32542-1498

   can be summarized for purposes of administration and payment in the manner of project segments as follows:

2. The Project consists of One story Satellite Concourse with 5 apron loaded gates with hold room spaces, public restrooms, vanilla box conscessions, Public Security Check point, misc offices for TSA, Airport and tenant. Misc site work associated with the construction of the builiding and utilities, sidewalks and apron as outlined in the drawings and specifications.

3. The contractor is to reference Contract Drawings Sheet G211 & G212 for illustration of project Alternates.

1.3 CONTRACTOR USE OF PREMISES

A. Limit use of the premises to construction activities within areas indicated; allow for any Owner and tenant occupancy, and use by the public.

1. Minimize any disruption to all operating areas, including parking areas.

   a. Existing public services and utility systems shall remain in operation during the construction period, excluding times required for installation of new work unless specifically allowed by the Contract.

   b. Schedule and coordinate outages and interruptions of public service with the VPS. See the specific forms for processes and time constraints. Utilize the following forms:

1) Form #XXX System Interruption/Utility Outage Notification.

2) Form #XXX System Interruption/Utility Outage Notification Procedured.

3) Form #XXX Security System Interruption/Outage Request

2. Provide all temporary directional signage, safety, and barricading required for passenger services.

   a. Submit a plan indicating signage, safety, and barricading for access routes, storage areas and work sites, at the pre-construction meeting.

   b. Directional signing at the access gate and or along the delivery route to the storage area or work site shall be as directed by the VPS.

3. Confine operations to areas within Contract limits indicated. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.

4. Access to site shall be shown on the plans or as directed by the VPS. Do not permit any unauthorized construction personnel or traffic on the site. Provide for traffic control to and from the various construction areas. Immediately clean-up any debris deposited along the access road as a result of construction traffic.

   a. Keep driveways and entrances serving the premises clear and available to the Owner, Tenant, their employees at all times, and the public. Do not use these areas for parking or storage of materials. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

5. All material orders for delivery to the site will use as a delivery address the access point at the Contractor's storage site.

   a. Coordinate with the VPS and allow for the least possible disruption of the facilities normal operations for delivery of materials and removal of demolished and discarded materials.

   b. Delivery of materials and removal of demolished and discarded materials shall be scheduled as follows:

      1) Schedule and coordinate all deliveries and removal of debris between the hours of 7:00 A.M. and 6:00 PM each day of the work week.

6. The limits of construction material storage areas, equipment storage areas, and parking areas shall be as indicated in the documents or as directed by the VPS. Erect and maintain secured fencing in complieance with FAA, TSA and VPS requirements, marking and warning devices suitable for both day/night use to

delineate the perimeter of all such areas. Provide secure gates for equipment. Gates shall be manned by TSA and VPS approved personel. 24 hours a day 7 days a week for the project durantion.

B. Use of the Existing Site Improvements: Maintain the improvement in a weathertight condition throughout the construction period. Repair damage caused by construction operations. Take all precautions necessary to protect the site its occupants and public during the construction period.

1.4 OWNER OCCUPANCY

A. Full Owner Occupancy: The Owner, its tenants, and the public will occupy the site and adjacent facilities (outside the limits of the construction area unless specified) during the entire construction period. Cooperate with the Owner during construction operations to minimize conflicts, facilitate occupancy usage, and protect persons and property in the project area during the entire construction period. Perform the Work so as not to interfere with the Owner's operations (including airfield operations).

1. Unless otherwise directed by the Owner, work shall be scheduled between the hours of 7:00 AM until 6:00 PM each day.

1.5 LAWS, PERMITS, AND REGULATIONS

A. Comply with all applicable laws, ordinances, regulations, codes, ADA requirements.

B. Obtain and pay for all license and permits, all fees and charges for connection to outside services and parking for Contractor's vehicles.

C. Abide by FAA, TSA and Owner’s safety and security regulations and procedures relative to access to, and work in, Airport Operations Areas and secured facilities.

D. Comply with Owner’s insurance requirements.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 11 00

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SECTION 01 21 00 - ALLOWENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Conditions/Provisions of the Contract, including Contractual Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements governing allowances.

B. All applicable allowances are included in the Total Amount Bid.

1.3 SCOPE, SELECTION AND PRICING

A. For each Work item covered by an allowance, the Contractor shall submit a Request for Change Order (RCO) at the earliest practical date after award of the Contract. The RCO shall include the scope of work, the schedule and the amount of allowance to be used for the Work item. The RPR will process a Contract Modification for the Work item in accordance with the terms of the General Conditions/Provisions and the Owner's policies regarding approval authority. Note that the General Conditions/Provisions outlines the various types of Contract Modifications as well as various methods of payment, including Force Account provisions.

B. At the RPR's request, obtain proposals for each applicable allowance item for use in making final selections. Include recommendations that are relevant to performing the Work.

C. Purchase products and systems selected by the RPR. Do not begin Work on an item covered by an allowance until a Contract Modification has been authorized by the Owner.

1.4 SUBMITTALS

A. General: Submit proposals for the work included in allowances, in the form specified for Change Orders.

1. Submit invoices or delivery slips to show the actual quantities of materials delivered to the site for use in fulfillment of each allowance.
2. Submit cut sheet, manufacturer's data, shop drawings and samples for products selected per Sec. 01 33 23 Shop Drawings, Product Data and Samples.

1.5 ALLOWANCES

A. Use the allowance only as directed by the RPR or Owner for the Owner's purposes. The inclusion of allowances in the Contract is not a guarantee that payment will be made for

the full amount of the allowance unless the Owner has determined there has been full compliance with the Contract Documents for each allowance.

B. Allowances shall only include the Contractor's direct costs and mark-up in accordance with the Changes in the Work Article of the General Conditions/Provisions.

1.6 UNUSED ALLOWANCES

A. At Project close-out, credit all unused allowance monies to the Owner by Change Order.

PART 2 - PRODUCTS

2.1 HOLDROOM SEATING

A. $125,000.00 for Hold Room seating as shown on drawing for Base Bid and Alternate No.1, 2 & 3. seating manufacturer and seating system type, color and fabric to be selected by Architect from seating manufacturers catalog.

2.2 LANDSCAPE

A. $40,000.00 for Landscaping as provided for in specifications and Drawing L100. Base Bid only.

PART 3 - PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine products covered by an allowance promptly upon delivery for damage or defects. Report findings and proposed corrective action to the RPR in writing.

3.2 PREPARATION

A. Coordinate all work for each allowance with related materials and installations to ensure that each allowance item is completely integrated and interfaced with related work.

3.3 SCHEDULE OF ALLOWANCES

A. Holdroom Seating, Base Bid, Alternate No. 1,2 & 3 in amount $125,000.00 to be prorated 40%, 20%, 20% & 20% respectively. See Bid Schedule/Form Sheet BF-8.

B. Landscaping, Base Bid Only in amount of $40,000.00

END OF SECTION 01 21 00

SECTION 01 23 00 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Conditions/Provisions of the Contract, including Contractual Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements governing Alternates.

1.3 DEFINITIONS

A. Definition: An alternate is an amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if the Owner decides to accept a corresponding change in either the amount of construction to be completed, or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost or credit for each alternate is the net addition to or deduction from the Contract Price to incorporate the Alternate into the Work. No other adjustments are made to the Contract Price.

1.4 PROCEDURES

A. Coordination: Modify or adjust affected adjacent work as necessary to completely and fully integrate that work into the Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not mentioned as part of the Alternate.

B. Notification: The Owner will notify each party involved, in writing, if alternates have been accepted, rejected, or deferred for later consideration.

C. Schedule: A schedule of alternates is included in the Bid Form. Specification Sections referenced in the Schedule contain requirements for materials necessary to achieve the Work described under each alternate.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES:

BASE BID: Construction of:
To the extent shown on drawings and specificaitons, see sheets G211 & G212.

Alternate #1 : Construction of:
To the extent shown on drawings and specificaitons, see sheets G211 & G212.

Alternate#2: Construction of :
To the extent shown on drawings and specificaitons, see sheets G211 & G212.
.

Alternate #3: Construction of :
To the extent shown on drawings and specificaitons, see sheets G211 & G2122.

Alternate #4: Covered Walkway
To the extent shown on drawings and specificaitons, see sheets G211 & G212.

Alternate #5: Outdoor Seating area :
To the extent shown on drawings and specificaitons, see sheets G211 & G212.

Alternate #6 : Substitution of ACT1: prorated addition to Base Bid, Alternates 1,2 & 3
To the extent shown on drawings and specificaitons. “CALLA” HIGH CAC 50 24” X 24” x 1 ¾” Ceiling Tile for ACT1, See AF712 ** Prorate basis on Square Feet of Tile Substituted see BF-8.

Alternate #7 : Substitution of GT1 & GT2: prorated deduction to Base Bid and Alternate 2
To the extent shown on drawings and specificaitons. CT2 for GT1 and GT2, See A45X SERIES & AF712 ** Prorate basis on Square Feet of Tile Substituted see BF-8.

END OF SECTION 01 23 00

SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Conditions/Provisions of Contract, including Contractual Conditions and other Division 1 Specification Sections, apply to this Section.
B. 01 25 01 – Substitution Request Form

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for handling requests for substitutions made after the Project is advertised.

B. Procedural requirements governing the Contractor's selection of products and product options are included under Section "Materials and Equipment."

1.3 DEFINITIONS

A. Definitions used in this Section are not intended to change or modify the meaning of other terms used in the Contract Documents.

B. Substitutions: Requests for changes in products, materials, equipment, and methods of construction required by Contract Documents proposed by the Contractor after the Project is advertised are considered requests for "substitutions.”

1. The following are not considered substitutions:

a. Revisions to Contract Documents requested by the Owner or A/E.

b. Specified options of products and construction methods included in Contract Documents.

c. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

2. Substitutions requested by Bidders during the bidding period and accepted prior to the bid date of Contract are subject to requirements specified in this Section for substitutions and will be incorporated into the Contract Documents by addendum.

1.4 SUBMITTALS

A. Substitution Request Submittal: Requests for substitution may be considered per the General Conditions of the Contract. Requests received may be rejected at the discretion of the A/E and County. The A/E will render a decision on a Request for Substitution received after award of Contract within thirty (30) days after the complete Request for

Substitution has been received by the A/E. Each Request for Substitution must be submitted as follows:

1. Submit four (4) copies of each request for substitution for consideration. Submit requests in the form and in accordance with procedures required for Change Order proposals in the General Conditions/Provisions.

2. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitutions, and the following information, as appropriate:

   a. Product Data, including Drawings and descriptions of products, fabrication, and installation procedures.

   b. Samples, where applicable or requested.

   c. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, code compliance, maintenance requirements, energy usage, and environmental considerations, performance, key components, and visual effect.

   d. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors that will become necessary to accommodate the proposed substitution.

   e. A statement indicating the substitution's effect on the Contractor's Construction Schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.

   f. Cost information, including a proposal of the net change in the Contract Sum.

   g. Certification by the Contractor that the substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of the failure of the substitution to perform adequately.

   h. A paragraph-by-paragraph comparison and analysis of the related specification section indicating compliance or variation from specification standard. If specified with a "Basis of Design", provide a comparison and analysis of each component of the manufacturers' detailed specification for the "Basis of Design". Each variation shall be substantiated with necessary submission to validate products compliance with specifications.

i. Failure to include the above requirements in the submittal may be cause for rejection of the submittal in its entirety.

3. State the amount of credit, for cost and time, if any, the Owner will receive as the result of the substitution, if applicable.

4. A/E’s Action: Additional information or documentation necessary for evaluation of the request may be requested. Notification of approved substitutions will be made by Addendum prior to bid and by a Change Notice after bid.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Conditions: The substitution request will be received and considered by the A/E when one or more of the following conditions are satisfied, as determined by the A/E; otherwise, requests will be returned without action except to record noncompliance with these requirements.

1. Extensive revisions to Contract Documents are not required.

2. Proposed changes are in keeping with the general intent of Contract Documents.

3. The request is timely, fully documented and properly submitted.

4. The request is directly related to an "or approved substitution" clause or similar language in the Contract Documents.

5. The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the Work promptly or coordinate activities properly.

6. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.

7. A substantial advantage is offered the County, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the County may be required to bear. Additional responsibilities for the County shall include additional compensation to the A/E for redesign and evaluation services, increased cost of other construction by the Contractor or separate Contractors, and similar considerations.

8. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where certification is provided that the substitution will overcome the incompatibility.

9. The specified product or method of construction cannot be coordinated with other materials, and where certification is provided that the proposed substitution can be coordinated.

10. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where certification is provided that the proposed substitution provides the required warranty.

11. Where a proposed substitution involves more than the Contractor, each subcontractor shall cooperate with the Contractor to coordinate the Work, provide uniformity and consistency, and to assure compatibility of products.

B. The submittal and the A/E’s acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

C. If the use of a substitute product requires additional work or modifications to new or existing facilities, all such additional work, including utility modifications shall be borne by the Contractor.

2.2 PROCEDURES

A. Selection Procedures: Options in product selection is governed by the Contract Documents and governing regulations, not by previous industry tradition or project experience. Procedures governing product selection include, but are not limited to the following:

1. Proprietary Specification Requirements: Where a single product or manufacturer is named, provide the product indicated. Other products will not be considered by the A/E.

a. Advise the A/E before proceeding when it is discovered that the named product is not a feasible solution.

2. Semi-proprietary Specification Requirements: Where two or more products and manufacturers are named, provide one of the products indicated. No substitutions will be permitted unless the specification indicates consideration of other products.

a. When products are specified by one manufacturer's model numbers or performance criteria with reference to other acceptable manufacturers, products manufactured by the acceptable manufacturers listed must meet minimum performance criteria specified or meet quality of models specified.

b. Advice the A/E before proceeding when it is discovered that the named product is not a feasible solution.

3. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with the requirements and are recommended by the manufacturer for the application indicated. General overall performance of a product is implied where the product is specified for a specific application.

4. Compliance with Standards, Codes, and Regulations: Where the Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes or regulations specified.

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 25 00

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SECTION 01 25 01 - SUBSTITUTION REQUEST FORM

TO:	PROJECT:
MLM-Martin Architects, Inc. 668 N. Orlando Avenue Suite 107 Maitland, FL 32751	Package Name: ITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE “C”

A/E Project No.: **19672** Date: _____

Submitted for consideration is the following product instead of the specified item for the above-noted Project.

Specification Section and Paragraph: _____

Drawings and Details affected: _____

Specified Item/Mfr/Model No.:

Proposed Substitution Description:

It is the General Contractor’s responsibility to provide all information to determine pro- posed substitution is equal to or better than the specified item. Complete product description, technical information, drawings, photographs, test data and performance information necessary for evaluation of requested substitution will be attached and marked for comparison purposes. Fill in ALL BLANKS below.

WHY IS SUBSTITUTION BEING SUBMITTED? (Select 1 of the following):

- ☐ Pre-Bid Substitution (Prior Approval): Include detailed analysis comparing proposed substitution against specified product, including redlined Specification Sections showing differences.
- ☐ Specified product is not available. Explain in detail using attached letter.
- ☐ Cost Savings to Owner. Indicate comparative cost analysis as attachment.
- ☐ Other (Explain):

EFFECTS OF PROPOSED SUBSTITUTION

(Attach complete explanations and technical data, including laboratory test, If applicable)

Include complete information changes to Drawings and/or Specification that proposed substitution would require for its proper Installation. Fill in blanks below:

A.	Does the substitution affect dimensions, locations, or configurations shown on Drawings? If "Yes", Explain:	☐ No	☐ Yes
B.	Will changes be required to the building/project or other construction in order to properly install or accommodate the requested substitution? If "Yes", Explain:	☐ No	☐ Yes
C.	What affect does substitution have on other trades? Explain:	☐ No	☐ Yes
D.	Will the General Contractor pay for any changes to the building design, including re-design, engineering and detailing cost caused by acceptance of the substitution request? If "No", explain:	☐ No	☐ Yes
E.	Does the requested substitution meet all applicable Codes, Ordinances and applicable standards? If "No", explain:	☐ No	☐ Yes
F.	Will the requested substitution affect the construction progress schedule and affect the "Contract Time"? If "Yes", explain:	☐ No	☐ Yes
G.	Has the requested substitution been used in similar applications? Identify:	☐ No	☐ Yes
H.	Does the manufacturer's warranty on the requested substitution differ from the specified item? If "Yes", explain:	☐ No	☐ Yes
I.	State monetary credit (itemized breakdown including overhead and profit) and reduction of Contract Time Owner will realize if this Substitution Request is accepted:		

The Architect and Owner will not be required to prove any product is not equal or suitable for the Project.

GENERAL CONTRACTOR'S CERTIFICATION OF EQUAL PERFORMANCE AND ASSUMPTION OF LIABILITY FOR EQUAL PERFORMANCE

The undersigned General Contractor states that the performance, function, quality and durability are equivalent or superior to the specified item. If General Contractor is a corporation, legal name of corporation shall be indicated below, along with signature(s) of the officer or officer's authorized to sign contracts on behalf of the corporation and corporate seal; if General Contractor is a partnership, the true name of the firm and the name(s) of the general partner(s) shall be indicated below with signature(s) of the partner or partners authorized to sign contracts on behalf of the partnership; and if the CM@R/General Contractor is an individual, his/her signature shall be placed below. Failure to provide legally binding signature(s) will result in non-consideration of Substitution Request.

Submitted By:

_____

Signature/Date:

_____ (Corporate Seal)

Name (Print)

_____

Title

_____

General Contractor Name

_____

Street Address

_____

City, State, Zip

_____

Witnesses

Attachments to this form: List all

ARCHITECT'S ACTION:

☐ Accepted	By:		Date:
☐ Accepted as Noted		Signature – A/E	
		Firm Name (Print)	
☐ Not Accepted	By:		Date:
☐ Received Too Late		Signature – A/E	
		Firm Name (Print)	
Comments:			

VPS ACTION:

☐ Accepted	By:		Date:
		Signature – VPS	
☐ Not Accepted	By:		Date:
		Signature – VPS	

SECTION 01 29 73 - SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Conditions/Provisions of Contract, including Contractual Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes: Schedule of Values.

1. Per General Conditions.
2. When requested by the A/E and or County, support values given with substantiating data.
3. Use Schedule of Values without limitation as a basis for the Applications for Payment.

B. Time Coordination: In coordination of initial submittals and other administrative start-up activities, submit Schedule of Values to the A/E at the earliest feasible date, but in no case later than ten (10) days after NTP for review by A/E and County. Submit Schedule of Values per General Conditions of Contract. The Contractor's Application for Payment cannot be processed for payment until the Contractor has submitted a Schedule of Values acceptable to the A/E and County.

1.3 FORM OF SUBMITTAL

A. Use AIA Document G-703 Continuation Sheet for the submittal format and or provide to the OAR in a MS Excel electronic file.

B. Use Table of Contents of the Project Manual as a basis for format or if a unit price contract use unit price schedule.

C. Identify each line with number and title as listed in Table of Contents of the Project Manual.

1.4 PREPARING AND SUBMITTING SCHEDULE OF VALUES

A. The Schedule of Values shall be used as a basis for determining progress payments on a contract. The Schedule of Values shall be a schedule of cost loaded construction activities equal, in total, to the awarded bid price and shall be in a form and sufficient detail to correctly represent a reasonable apportionment of the Contract price. Prepare Schedule of Values, in coordination with Progress Schedule. Correlate line items with

other administrative schedules and forms required for the Work, including progress schedule, payment request form, listing of subcontractors, schedule of alternates, schedule of allowances, listing of products and principal suppliers and fabricators, and schedule of submittals.

B. Provide breakdown of Contract Sum in sufficient detail to facilitate continued evaluation of payment requests and progress reports. Breakdown amounts of major cost items into several line items. Round off to nearest whole dollar, but with total equal to Contract Sum.

C. Submit one (1) copy of the Schedule of Values to the A/E and County.

D. Arrange schedule with columns to indicate generic name of item, related Specification Sections; subcontractor, supplier, manufacturer, or fabricator; change orders which have affected value; dollar value of item, and percentage of Contract Sum to nearest one-hundredth percent and adjusted to total 100 percent.

E. Margins of Cost:

1. Show line items of indirect costs, and margins on actual costs, only to extent such items will be individually listed in payment requests.

2. Establish each item in Schedule of Values and in payment requests to be complete with total expenses and proportionate share of general overhead and profit margin.

3. Major cost items, which are not directly cost of actual work-in-place, such as distinct temporary facilities, may be either shown as line items in Schedule of Values or distributed as general overhead expense.

F. Break down installed cost into:

1. Cost of product, delivered and unloaded at Job Site with taxes paid. (List under Column F, G-703)

2. Total installed cost, with overhead and profit. (List under Column C, G-703).

1.5 SUBSCHEDULE OF UNIT MATERIAL VALUE

A. Submit a sub-schedule of unit costs and quantities for products that progress payments will be requested for stored materials.

B. The form of submittal shall parallel that of the Schedule of Values, with each item identified the same as the line item in the Schedule of Values.

C. The unit quantity for bulk materials shall include an allowance for normal waste.

D. The unit values for the materials: the cost of the material including taxes, delivered and unloaded at the Site.

E. The installed unit value multiplied by the quantity listed shall equal the cost of that item in the Schedule of Values.

1.6 REVIEW AND RESUBMITTAL

A. After review by the A/E and County, revise and re-submit Schedule (and Schedule of Material Value) as required.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 29 73

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SECTION 01 31 13 - PROJECT COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Conditions/Provisions of the Contract, including Contractual Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and supervisory requirements necessary for coordinating construction operations including, but not necessarily limited to, the following:

1. General project coordination procedures.
2. Conservation.
3. Coordination Drawings.
4. Administrative and supervisory personnel.
5. Cleaning and protection.

1.3 COORDINATION

A. Coordinate construction operations included in various Sections of these Specifications to assure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections that depend on each other for proper installation, connection, and operation.

1. Schedule construction operations in the sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.

2. Coordinate installation of different components to assure maximum accessibility for required maintenance, service, and repair.

3. Make provisions to accommodate items scheduled for later installation.

B. Where necessary, prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and attendance at meetings.

1. Prepare similar memoranda for the A/E and separate contractors where coordination of their work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and assure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of schedules.
2. Installation and removal of temporary facilities.
3. Delivery and processing of submittals.
4. Progress meetings.
5. Project closeout activities.

D. Conservation: Coordinate construction operations to assure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment involved in performance of, but not actually incorporated in, the Work.

1.4 SUBMITTALS

A. (SD-25) Coordination Drawings: Prepare coordination drawings where careful coordination is needed for installation of products and materials fabricated by separate entities. Prepare coordination drawings where limited space availability necessitates maximum utilization of space for efficient installation of different components.

1. Show the relationship of components shown on separate Shop Drawings.
2. Indicate required installation sequences.
3. Comply with the Article “Submittals” contained in each section.

B. (SD-07) Staff Names: At the Pre-Construction meeting, submit a list of the Contractor's principal staff assignments, including the superintendent and other personnel in attendance at the Project Site. Identify individuals and their duties and responsibilities. List their addresses and telephone numbers.

1. Post copies of the list in the Project meeting room, the temporary field office, and each temporary telephone.

PART 2 - PART 2 - PRODUCTS (Not Applicable)

PART 3 - PART 3 - EXECUTION

3.1 GENERAL COORDINATION PROVISIONS

A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which Work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

B. Coordinate temporary enclosures with required inspections and tests to minimize the necessity of uncovering completed construction for that purpose.

3.2 CLEANING AND PROTECTION

A. General: Refer to the General Conditions of the Contract for Construction.

B. Cleaning: Cleaning shall be performed by the Contractor on a daily basis. The entire Work area shall be left in a broom clean, or equivalent condition.

1. Clean and protect construction in progress and adjoining materials in place, during handling and installation. Apply protective covering where required to assure protection from damage or deterioration until Substantial Completion is accepted.

2. Clean and provide maintenance on completed construction necessary through the remainder of the construction period. Adjust and lubricate operable components to assure operability without damaging effects.

C. Protection - Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

END OF SECTION 01 31 13

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SECTION 01 31 14.13 - SPECIAL PROCEDURES

PART 1 - GENERAL

1.1. RELATED DOCUMENTS

The Contractor and their subcontractors shall comply with all system interruptions and utility outage notification requirements, procedures and/or forms specified herein.

A. Documents

1. Use the latest version of the UON Procedures for Contractors

1.2. DEFINITIONS

Acronym	Refers to:
UON	Utility Outage Notification
VPS	Destin-Fort Walton Beach Airport
RPR	Resident Project Representative
MSDS	Material Safety Data Sheet
PPE	Personal Protection Equipment
LOTO	Lock-Out Tag-Out (electrical safety procedures)
BHS	Baggage Handling Systems
IT	Information Technology
GPR	Ground Penetrating Radar
SAM	Security Area Monitor
MOT	Maintenance of Traffic
AOC	Airport Operations Center
AOA	Airport Operations Area
AHJ	Authority Having Jurisdiction

1.3. GENERAL INSTRUCTIONS

A. System interruptions and utility outage notifications (UONs) are required during maintenance tasks, renovation work, tenant moves, and new construction work (the Work) in any and all instances where existing systems, utilities, services or operations are understood to be impacted by the Work.

B. The Contractor is required to plan, research, communicate, conduct and close out all utility outage notifications issued as required for the Contractor to effectively and expeditiously conduct the Work.

C. The Contractor is required to ensure that all execution steps, those outlined herein and those implied, and those required to plan, research, communicate, conduct and close out all utility outage notifications, have been followed to minimize interruptions to existing operations while completing the Work.

D. The Contractor is required to submit the completed UONs at least 120 hours (144 hours for a Security UON) in advance of execution of the Work.

E. UONs shall be sent to the Clearinghouse by the RPR for Action; the Clearinghouse has a 48 hour clock to Accept, Reject, or Accept the UON with Modifications. The Owner (Airport Department Sponsor or RPR) will authorize the UON.

F. UONs associated with Security systems require 96-hour advance notification, whereas all other UONs require 72-hour advance notification. Note that advance notification time starts after Owner Authorization of the UON.

G. In cases where there is both a Security UON and another type of UON (2nd UON) needed for the work, the Security UON shall be approved prior to sending the 2nd UON; Both UONs shall be sent together for Clearinghouse Action; the Clearinghouse has a 48 hour clock to Accept, Reject or Accept the UON with Modifications; after the Owner Authorization of the UON, the 72 hour notification clock begins. Holidays and weekends count as 12-hour days.

H. The Contractor is required to follow/make use of the latest revision of the *UON Construction Forms* and associated *UON Procedures for Contractors* and the *UON Checklist*.

PART 2 - PRODUCTS (not applicable)

PART 3 - EXECUTION

3.1. UON PLANNING

A. Research

1. The Contractor is required to research all available information, including review of conformed documents, as-built drawings, previous and associated UONs, and, as required, field installations and conditions, for preparation of a complete UON.

2. The Contractor is required to provide all required permits prior to execution of the Work.

B. Site Installation Crew Conference

1. The Contractor is required to conduct and evidence a site installation UON conference with the trade crew personnel that will be executing the Work outlined in the UON, on location.

C. MOT (where required)

1. The Contractor is required to include MOT information should the UON or any activity to enable the Work as outlined in the UON, impact existing vehicular or pedestrian traffic flow or patterns.

D. UON Which Includes Slab Drilling

1. The Contractor is required to include Ground Penetrating Radar or X-Ray services for all UONs that involve drilling into or through ground or elevated slabs.

E. Site Safety Plan Review and Briefing

1. The Contractor is required to review the site-specific safety plan with the trade crew personnel, and evidence that the review/briefing covered proper requirements and procedures associated with Arc Flash Studies, Personal Protection Equipment (PPE), and Lock-Out/Tag-Out, as required for the Work outlined in the UON.

F. UON Affecting BHS

1. The Contractor is required to coordinate with Airport Operations on all work anticipated to affect the Baggage Handling Systems.

G. UON Affecting IT

1. The Contractor is required to formally request access into Communications Rooms to the RPR who will then coordinate with the Owner. Access into any Communications Room is limited to experienced and certified personnel having Airport photo identification badges, performing the Work and for a limited amount of time. The Owner will most likely limit access to only the firm actually performing the work in the Communications Rooms. The Contractor shall allow sufficient time (a minimum of 72 hours) for the processing of an access request for Communications Rooms.

2. The Contractor is required to coordinate with Airport IT, through the RPR, all work anticipated to affect the infrastructure, telecommunication systems, and/or emergency telephones at the elevators.

H. UON Affecting Life Safety

1. The Contractor is required to research sprinkler valve locations and Fire Alarm Point Numbers affected; this information MUST be included in any UON submitted and must be coordinated with Airport Life Safety, through the PRP.

2. The Contractor MUST be in communication with the COMM Center at every step outlined in the *UON Checklist*

3. The Contractor CANNOT leave a closed valve unattended for ANY reason (or leave property) in the closed position without either restoring the valve to its normal operating condition or establishing an RPR-approved, ongoing fire watch.

I. External Resources to Support UON

1. It is not unusual for UONs to require external resources that enable and support the actual work to be performed as outlined in the UON. The Contractor is required to provide all external resources necessary to successfully execute the UON.

2. The Contractor is required to identify the external resources required to complete the UON.

3. External resources may include, but are not limited to; personnel to direct the public around affected areas (Greeters), Security Area Monitors (SAMs), Off-Duty law enforcement officers, flagmen, certified systems technicians (Life Safety – CSG), and/or temporary signage.

3.2. SITE PERMITS

A. Energized Electrical Work Permit

1. All UON work associated with an energized electrical power source will require an Electrical Work Permit. The Contractor is required to have a qualified and licensed electrician complete all information required on the Energized Electrical Work Permit.

2. The Contractor is required to coordinate, through the RPR, with Airport Safety for its review and authorization of the Work once the appropriate safe work items and tasks have been verified.

3. The Contractor is required to display the completed and signed-off Energized Electrical Work Permit in the area of Work.

B. Hot Work (Burn) Permit

1. All UON work that involves grinding, welding, or dust-generating tasks will require a Hot Work (Burn) Permit. The Contractor is required to have a qualified supervisor complete all information required on the Hot Work (Burn) Permit.

2. The Contractor is required to coordinate with the Airport’s Safety Consultant for its review and authorization of the Work once the Hot Work (Burn) Permit information is deemed accurate.

3. The Contractor is required to display the completed and signed-off Hot Work (Burn) Permit in the area of Work.

C. Sunshine 1 Notification for non-Airport Owned Utility Work

1. The Contractor is required to obtain required Sunshine 1 notifications for all non-Airport owned utility work and submit to the RPR prior to start of the UON. The Contractor is required to display notifications at the area of Work.

3.3. PRIOR TO EXECUTION OF UON WORK

A. Prior to the execution of the Work as outlined in the UON, the Contractor is required to;

1. Ensure that all equipment, tools and materials required for the Work is on site

2. Ensure adequate number of qualified personnel required for the Work is on site

3. Reassess and confirm that the timeframe to conduct the Work is adequate

4. Revisit the UON work plan and trade crew logic to complete the Work

5. Ensure the UON has been approved, and that a signed copy is in hand and displayed at the Work areas

6. When applicable, verify transfer switches go to an alternate power source before the start of the outage

B. Should temporary electrical power be required to execute the Work as outlined in the UON, the Contractor is required to:

1. Ensure the temporary electrical power source or generation unit(s) has been adequately sized to handle the load

2. Ensure the temporary electrical power source or generation unit(s) is on site and ready

3. Ensure its location has been approved by the RPR and Owner

4. Ensure proper conductors to connect the temporary electrical power generation unit(s) and transfer switch(es) are on site

5. Ensure the temporary electrical power source or generation unit(s) has been started, and voltage and rotation verified

6. Ensure sufficient fuel for the temporary electrical power generation unit(s)

7. Ensure a refueling source and spill kit have been set up

8. Ensure a dedicated fire extinguisher is available for the temporary electrical power generation unit(s)

9. Ensure a successful test run of the temporary electrical power generation unit(s) and transfer switch(es) through a complete cycle

10. Ensure that emergency contact information is displayed on the temporary electrical power generation unit(s)

11. Ensure that the temporary electrical power generation unit(s) and transfer switch(es) have been left in their proper configuration

3.4. VERBAL NOTIFICATION PRIOR TO EXECUTION OF UON WORK

A. Prior to the execution of the Work outlined in the UON, the Contractor is required to complete all tasks associated with verbally notifying interested or affected parties. The Contractor is required to complete the *UON Checklist* with the entities listed below:

1. Revisit recipients on Call List

2. Briefly describe the UON work to those on the Call List

3. Contact Maintenance Dispatch / Central Plant on ALL UONs: Phone number to be provided at NTP.

4. Contact Airport Operations Center on ALL UONs: Phone to be provided at NTP
    a. Including assessment of late flight departures and arrivals and/or other potential operational impacts to airlines or airlines use of BHS
5. Contact Airport Operations BHS on ALL UONs: Phone number to be provided at NTP.
6. Contact Airfield Operations on UONs where high-mast lighting is involved or if traffic movement on AOA will be affected: Phone number to be provided at NTP.
7. Contact Communications Center on UONs where Fire Alarm and/or Life Safety systems (including fire doors or suppressions systems) are affected: Phone number to be provided at NTP.
8. Coordinate with Life Safety Department to ensure that proposed UON does not interfere with other previously scheduled work

3.5. EXECUTION OF UON WORK

A. The Contractor is required to ensure that only qualified, and where required, licensed personnel will be performing the Work as described in the UON.

B. For Life Safety- Sprinkler Valves

1. Once a valve is closed, verification from the COMM Center/Airport Operations MUST confirm that the management system has flagged that particular valve in a trouble state and it notes that the valve has been closed.
2. A tag must be affixed to the valve, by the Contractor to include the following information:
    a. Company Name
    b. Technician Closing the Valve
    c. Time and Date of Closure
    d. Contact Information of person closing the valve
    e. Project number
    f. Expected duration (or attach a copy of the UON)
    g. Area affected (or attach copy of the UON)

3.6. POST EXECUTION OF UON WORK

A. After completion of the Work as outlined in the UON, the Contractor is required to have its qualified supervisor;

1. For Life Safety – Sprinkler Valves
    a. Once the valve is put back to its normal position, the COMM Center/Airport Operations must be called to reset the valve—give location
    b. Once the valve is confirmed reset and back to normal, only then can the TAG be removed by the Contractor
    c. If for some reason the Contractor finds an issue with the valve and it cannot be opened, tamper switch malfunctions, leaks, or won't reset, a work order must be submitted immediately for Airport to address.
    d. Contractor CANNOT leave the valve unattended for ANY reason (or leave property) in the closed position without either restoring the valve to its normal operating condition or establishing an RPR-approved, ongoing fire watch.
    e. The Contractor's Project Manager (PM)/Superintendent is responsible to confirm that the system is back to normal before shift's end
    f. In the event of a malfunction in the Tamper Switch which causes the valve to remain in trouble (which would "indicate" still closed) but the valve is actually open, the Contractor's PM/Superintendent MUST call the COMM Center to make sure the trouble is annotated and written confirmation that the valve IS open
    g. In NO CASE shall a sprinkler valve ever be disabled electronically on the fire alarm system.
2. Ensure that the Work has been in fact completed as planned
3. Ensure that no tools have been left inside electrical gear/equipment
4. Authorize removal of LOTO items, only after confirming completion of the UON Work, and as described in items 1 and 2 above
5. Ensure posted UON is removed as soon as the Work has been completed
6. Verbally notify all recipients on the Call List, as described in section 3.4, that the UON Work has been completed
7. Ensure that a weekly inspection/test plan is in place and communicate inspection dates to the RPR
8. Notify, in writing, to the RPR, of any and all Code compliant items or other anomalies encountered during the UON Work for resolution
9. Update panel schedules with any new information immediately after the completion of the UON work. The Contractor is hereby notified that a typed panel schedule update, per NEC 408.4, must be in place within seven (7) days of the UON work completion

3.7. FAILURE TO COMPLY

1. The Contractor’s adherence to the UON process and procedures herein outlined is critical in ensuring minimal impacts to ongoing airport operations during and after the completion of the Work requiring UONs.

2. Adverse impacts to the Contractor’s schedule caused by the Contractor’s failure to comply with the process and procedures herein outlined, will require the Contractor to recover the time and any and all associated costs will be borne by the Contractor.

3. Should the Contractor’s noncompliance turn symptomatic, the Owner will contract the required resources to complete the UON process and procedures, but the associated costs, if any, will be borne by the Contractor.

END OF SECTION 01 31 14.13

SECTION 01 31 19 - PROJECT MEETINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Conditions/Provisions of the Contract, including Suplemental Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies administrative and procedural requirements for project meetings, including, but not limited to, the following:

1. Job coordination meetings (JCM’s).

2. Pre construction/preinstallation conferences.

1.3 PROGRESS MEETINGS

A. General: Conduct Job Coordination Meetings (JCM’s) at the Project Site, or at an alternate location designated by the A/E, Owner or RPR on a bi-weekly basis.

1. The Owner may request additional Job Coordination Meetings or may require the Contractor to increase the frequency of JCM’s, to once-a-week, depending upon project progress. Additional meetings or changes in meeting frequency, as directed by the RPR, shall not affect the cost of the original Contract.

B. Attendees: In addition to the Contractor, A/E and RPR (Resident Project Representative), each subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.

C. Agenda: The RPR will record meeting minutes and update the agenda.

1. Contractor's Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor's Construction Schedule, whether on time or ahead or behind schedule. Discuss whether schedule revisions are required to insure that current and subsequent activities will be completed within the Contract Time.

2. Contractors Look Ahead: Contractor shall present and distribute a fourteen (14) day look ahead schedule during the “Schedule” portion of the meeting.

3. Review the present and future needs of each entity present, including such items as:

a. Interface requirements.
b. Status of permits
c. Time/schedule status/look ahead schedule.
d. Sequences.
e. Deliveries.
f. Off-site fabrication issue.
g. Access.
h. Site utilization.
i. Submittals.
j. Requests for information.
k. Non-compliance notices.
l. Temporary facilities and services.
m. Hours of work.
n. Resource allocation.
o. Hazards and risks.
p. Housekeeping.
q. Quality and work standards.
r. Safety issues.
s. Change orders, Field orders
t. Documentation of information for payment requests.
u. Other pertinent Constrution matter.

D. Reporting: Transcript copies of each meeting will be distributed to each attendee and to those parties who were scheduled but unable to attend.

E. Schedule Updating: Refer to Section 01 32 13, Scheduling of Work.

F. As-Built Documents: Review progress of as-built documents for all disciplines of work. The Contractor and RPR shall coordinate a time to review the as-built documents the same day as the JCM.

1.3 PRECONSTRUCTION/ PREINSTALLATION CONFERENCES

A. General: Where required by the RPR, A/E or by individual specification sections, conduct preconstruction conferences at the Project Site before each construction activity that requires coordination with other construction. Preconstruction or preinstallation conferances will be held after review of shopdrawings is completed and returned to the G.C. by the A/E.

B. Attendees: The Installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise the RPR and A/E of scheduled meeting dates.

1. Review the progress of other construction activities and preparations for the particular activity under consideration at each preconstruction conference, including, but not limited to, the following:

    a. Contract Documents.
    b. Options.
    c. Shop Drawings, Product Data, and quality-control samples.
    d. Coordination requirements.
    e. Time schedules.
    f. Weather limitations.
    g. Manufacturer's recommendations.
    h. Warranty requirements.
    i. Governing regulations.
    j. Inspecting and testing requirements.
    k. Recording requirements.
    l. Protection.
    m. Related change notices.
    n. Purchases.
    o. Deliveries.
    p. Possible conflicts.
    q. Compatibility problems.
    r. Acceptability of substrates.
    s. Temporary facilities.
    t. Space and access limitations.
    u. Safety.
    v. Required performance results.

2. Record significant discussions of each conference, and the approved schedule. Promptly distribute a typewritten copy of the record of the meeting to all attendees.

PART 2 – PRODUCTS (Not Applicable)

PART 3 – EXECUTION (Not Applicable)

END OF SECTION 01 31 19

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SECTION 01 32 13 – SCHEDULING OF WORK

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Conditions/Provisions of Contract, including Contractual Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section provides for the comprehensive depiction, measurement, assessment and reporting of project progress and status pursuant to the sub-articles entitled "Contractor's Construction Schedules" of the General Conditions/Provisions. The Contractor's responsibility shall include scheduling of all work within its contractual scope of work, creation of a Preliminary Schedule, a Baseline Schedule, production of reports, narratives, execution of the plan described by the current accepted schedule, participation in meetings with the RPR, and submission of Progress Schedules and revision data, as set forth herein. Conventional Critical Path Method (CPM) techniques must be utilized to satisfy the requirements of this section.

1.3 DEFINTIONS

A. Activity: A discrete entity of a project schedule that when combined relationally with others develop a network that can be used for planning, scheduling and monitoring of a construction project. Activities contain duration derived from applied resources such as cost, manpower, equipment and material.

1. Critical Activity: An activity that must start and finish as planned.
2. Predecessor Activity: An activity preceding another activity in a network.
3. Successor Activity: An activity succeeding another activity in a network.

B. Critical Path Method (CPM): An analytical process of scheduling activities using formalized procedures such as “forward pass” and “backward pass” establishing the optimum sequence and duration of operation inclusive of the interrelation of the effort required for the timely completion of the project. Forward pass calculations provide the earliest time in which a project can complete providing “early” dates. Backward pass calculations provide the latest time in which a project can complete providing “late” dates.

C. Total Float: The difference between the early and late dates and is the amount of time an activity can be delayed without delaying the overall project completion.

    1. Float is not intended for the exclusive use or benefit of either the Owner or Contractor. It is considered jointly owned by both parties and is a resource available as needed to meet the Contract Times.

    2. Float suppression techniques such as use of discretionary logic, inflated activity duration and/or lag/lead is prohibited.

D. Critical Path: The longest continuous path of interrelated activities with the least amount of total float establishing the minimum overall duration of the project from the data date to completion.

E. Data Date: The date (and time) by which all progress is captured for a given time period.

F. Work Breakdown Structure (WBS): A hierarchical arrangement that defines the project by phases, deliverables and work packages.

    1. WBS shall be the Contractor's primary means to organize the schedule. The RPR may need to dictate the Contractor's WBS levels to adhere to the overall program organization.

    2. Activity Coding at the PROJECT LEVEL can be used by the Contractor as a secondary means of organizing the schedule, but GLOBAL Activity Coding is prohibited.

G. Cost Loading: The allocation of the schedule of values necessary for the completion of an activity as planned. The sum of the costs for all activities must equal the total Contract Price unless otherwise approved by the RPR.

    1. Cost Loading, at a minimum, must inherently depict the monthly cash flow derived from the CPM Schedule.

H. Resource Loading: The allocation of manpower, material and equipment necessary for the completion of an activity as planned.

    1. Manpower loading must be defined utilizing manhours per activity.

I. Relationship Types: Activity dependency or CPM Schedule logic

    1. Finish-to-Start (FS) - A relationship between activities in which the start of a successor activity depends on the finish of its predecessor activity.

2. Start-to-start (SS) - A relationship between activities in which the start of a successor activity depends on the start of its predecessor activity.
3. Finish-to-Finish (FF) - A relationship between activities in which the finish of a successor activity depends on the finish of its predecessor activity.
4. Start-to-Finish (SF) - A relationship between activities in which the finish of a successor activity depends on the start of its predecessor activity. (Rarely used)

J. Open-Ends: Activities without predecessor or successor activities.

K. Dangling Activities: Activities with FF or SF predecessor relationship types (open start) or SS or SF successor relationship types (open finish).

1.4 QUALITY ASSURANCE

A. Scheduling Qualifications: The Contractor must employ a designated Project Scheduler or Scheduling Consultant. This specialist must be experienced in CPM Schedule development, management and reporting and have a minimum of 5 years' experience with Primavera Scheduling Software, preferably P6, on Projects of similar size and complexity.

1. At any time the OAR may order the Contractor to replace the designated scheduler with another if the current scheduler is deemed unacceptable based on qualifications or performance.

B. Required Computerized CPM Scheduling System: For Projects exceeding $2 million in Contract Price, Oracle Primavera P6 Professional Project Management (P6 PPM) or Oracle Primavera P6 Enterprise Project Portfolio Management (P6 EPPM) must be the computer scheduling software system utilized. For Projects less than $2 million, any other planning software may be employed (e.g. Primavera Contractor, Microsoft Project, etc.) providing the Critical Path can be derived.

C. Schedule Alignment Meeting: Conduct a Prescheduling conference at Project Site to ensure compliance with all requirements within this Section as well as related documents as it relates to CPM Schedule development, management and reporting including but not limited to:

1. Review Planning Software.
2. Verify Scheduling Qualifications.
3. CPM Schedule Organization (WBS) and Detail.
4. Owner / Interface Milestones between concurrent or other Projects.

5. Review time required for Owner / OAR activity such as submittal review, testing and inspecting, commissioning, training and closeout.
6. Updating Procedures.
7. Activity ID Coding and File Nomenclature and submission.
8. Coordination and time commitments for subcontractors and all other entities involved.

1.5 SUBMITTALS

A. Submit the following in accordance with the General Conditions of the Contract for Construction (GC).

B. Format: Submit required submittals via email unless directed otherwise by the RPR in the following format:

1. Working P6 electronic (XER) file with the following File Naming Structure indicative of Bid Package Number, Data Date and file extension:

   a. ITB-AP_21-21_dd-mmm-yy.xer(mpp)

2. PDF files for Detailed (All Activities) CPM Schedule and Longest Path with the following Title Block information (use Header and/or Footer):

   a. Contractor's Name
   b. Owner's Bid Package Number & Project Name
   c. Schedule Type (e.g. "Detailed Schedule", "Longest Path", etc.)
   d. Data Date
   e. Run Date
   f. File Name
   g. Symbol Legend
   h. P6 Project ID
   i. Layout & Filter Name

PART 2 - PRODUCTS

2.1 CONTRACTOR'S PROJECT SCHEDULES

A. Produce the following Construction Schedules in accordance with the General Conditions of the Contract for Construction (GC).

1. Preliminary Schedule

2. Baseline Schedule
3. Progress Schedules

B. Produce the following Schedules as required and in accordance with the General Conditions of the Contract for Construction (GC) as applicable.

1. Recovery Schedules

a. If at any time the Contractor's Progress Schedule indicates the project is two or more weeks (14 calendar days) behind any current contractual completion date(s), the Contractor must first submit both a graphic (Longest Path) and written (narrative) report measuring the extent of the delay regardless of assumed causation and then a separate Recovery Schedule indicating means by which the Contractor intends to regain schedule compliance.

2. Job Coordination Meeting (JCM) Look-Ahead Schedules

a. With each monthly Progress Schedule, the Contractor must develop a Four Week Look-Ahead Schedule derived from the update indicating one week of As-Built progress prior to the Data Date and four weeks of As-Planned progress beyond the Data Date. It is intended that this document shall serve as the working schedule document at the JCM to ascertain incremental weekly progress until the following monthly Progress Schedule is updated. If at the discretion of the RPR this document becomes unusable due to out of sequence progress or for other reasons such that the incremental weekly progress cannot be ascertained, the Contractor must implement weekly updates until the RPR is satisfied that the progress is being accurately depicted.

b. Look-Ahead Schedules must be submitted in colored .pdf format via email to the OAR at least 48 hours prior to the JCM.

3. Delay Claim Entitlement Schedules

a. If at the Contractor's discretion a delay beyond the Contractors control is encountered and after the Contractor has made every effort and reasonable attempt to mitigate the impacts of the delay without additional costs to the Owner or disruption to the project, a request for additional time may be requested. All requests for extensions of time must be submitted within the confines of the Contract and accompanied by a reputable delay analysis technique and narrative. Time extensions

shall only be granted if the delay is excusable and impacts the critical path of the project at the time of the delay.

4. As-Built Schedules

   a. After all Contract work items are complete, and prior to final payment, the Contractor shall submit the final Progress Schedule that will be called the "As-Built" Schedule, showing actual start and actual finish dates for all schedule activities and milestones.

5. Early Completion Schedules

   a. The contract completion date shall not be changed by submission of a schedule that shows an early completion unless specifically authorized by RPR Change Order.

2.2 CONTRACTOR’S SCHEDULE NARRATIVES

A. Any and all Project Schedules (e.g. Preliminary, Baseline, Progress, Recovery and/or Request for Time Extension) shall be submitted with an accompanying narrative explaining the schedule consistent with its purpose.

2.3 MONTHLY REPORTS

A. Summary Level Schedules, Cash Flow Curves and physical percent complete based on manpower analysis derived from the monthly Progress Schedule must accompany the Contractor’s Monthly Reports.

PART 3 - EXECUTION

3.1 SCHEDULE REQUIREMENTS

A. Activity Types: In addition to construction activities, the CPM Schedules shall include other individual activities and milestones as applicable:

1. Contractual milestones, such as Notice to Proceed, Substantial Completion, Certificate of Occupancy, Final Completion or any other Contract milestones.
2. Design deliverables and milestones as applicable.
3. Permitting Activities as applicable.

4. Procurement Activities such as: subcontractor scope review and buyout, submittal and shop drawing preparation, submittal approval, release and order of material and equipment, material and equipment fabrication and delivery.
5. Interim Contractor's milestones as applicable.
6. All Utility Outage Notifications (UON's) as required.
7. Owner Activities such as Owner Furnished Contractor Installed (OFCI), Owner Furnished and Owner installed (OFOI), Tenant move-out and occupancy, swing space and Owner required utility payments or any other Owner activity that may affect schedule.
8. Completion Activities such as Commissioning, testing, turnover, training, Contractor and RPR punch and final inspections by system.

B. The RPR may identify additional interfaces during the course of the Work and the Contractor will incorporate these in the Progress Schedule as required. No composite activities allowed. The CPM Schedules must break out all activities into their respective trades. At a minimum, at least one construction activity and one procurement string must be identified in the CPM Schedules for each subcontractor on the project as applicable.

C. Activity ID's: The Contractor's CPM Schedule shall contain an intelligent activity identification coding system that must include the Project Number (C19-2811) as a prefix to all Activity ID's in the schedule. If activities are deleted from the schedule after the Baseline has been accepted, the Contractor must log these occurrences and submit this information to the RPR consistent with the schedule submission inclusive of the activity deletions. It is recommended that the Contractor include this information with the accompanying schedule narrative. Duplication of Activity ID's with differing activity descriptions is prohibited.

D. Activity Duration: With exception to the Preliminary Schedule, the duration for each activity shall be based on manpower assignment and production rates estimated in work days and may not exceed 20 days except for:

1. Procurement Activities such as fabrication or lead time. Procurement activity strings must include separate activities for submittal preparation, approval, release and order, fabricate and delivery. Any procurement activity requiring duration greater than 60 days must be explained by the Contractor before accepted into the CPM Schedules by the RPR relationship types shall be utilized to show activity dependence. At a minimum, each activity shall have one FS or SS predecessor and one FS or FF successor with the exception of the first and last activities in the network such that no other activities shall be open-ended or dangling.

E. Lags and Leads: The use of lags or leads between activities is not encouraged. Instead, it is preferable to use an activity to represent the time lapse between two activities. The use of negative lags is prohibited.

F. Date Constraints: The use of constraints is not encouraged but at times necessary especially considering internal Owner operation and external Owner projects that may be occurring simultaneously with inter-project dependency. Any use of constraints must be explained by the Contractor consistent with the schedule submission inclusive of the constraint(s). Depending on the type of constraint(s) used and where the constraint(s) are applied may lead to suspect schedule calculations specifically related to total float. It is the responsibility of the Contractor to verify the accuracy of the schedule calculations derived from the use of constraints.

G. Calendars: With the sole exception of the required Global Resource Calendar, all calendars must be represented on the Project Level and shall not inherit holidays or exceptions derived from their originating Global Calendar. Any other use of Global Calendars is prohibited. Any schedule submitted with Global Calendars will be rejected and not accepted until remedied. It is recommended that the Contractor develop the following Project Calendars with the following labels:

1. CXX-XXXX: 5 Day-8hrs/day (with 7 standard holidays) depicting the standard work week (M-F) with Saturday, Sundays and the Standard Holidays represented as non-work days. Standard holidays include: New Year's Day, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day and Friday after and Christmas Day.

    a. Assign this calendar to all Contractors' general work activities.
    b. Assign this calendar to all Owner activity.

2. CXX-XXXX: 7 Day-8hrs/day (All Days) depicting all days containing no holidays or non-work days.

    a. Assign this calendar to all Summary or Level of Effort Activities.
    b. Assign this calendar to Contractual Milestones.

H. Other Project Calendars may be used as needed by the Contractor on a case-by-case basis but in each case, supporting documentation explaining its use must be submitted to the OAR for acceptance. All Project Calendars detailed work hours by work day must be set to 8:00am-12:00pm and from 1:00pm-5pm with 12:00pm-1:00pm represented as a non-work hour such that each work day is representative of 8 hours unless approved otherwise by the RPR.

I. Activity Coding: The Contractor must utilize WBS to organize the CPM Schedules. Prior to and part of the RPR's Baseline Schedule acceptance, the Contractor must provide the RPR their proposed WBS for OAR approval.

J. Data Dates: The Data Date shall be controlled by the RPR so that all Contractors are using the exact same dates each month consistent with the Owner's overall program. The Owner shall provide the Contractor reporting calendar information where monthly update Data Dates will be specified.

3.2 CONTRACT MODIFICATIONS

A. For each proposed contract modification and concurrent with its submission, the Contractor shall prepare a delay analysis demonstrating the impact of the proposed change on the overall project schedule or interim contract milestone(s) if applicable. If said change is approved by the RPR, the Contractor shall incorporate the contract modification into the Progress Schedules for the period in which the change was issued.

3.3 SCHEDULE CALCULATIONS AND DIAGNOSTICS

A. Multiple Project Schedules will be maintained within the RPR's scheduling system. As such, all schedule data submitted by the Contractor must be submitted on the Project Level. No Global data shall be accepted unless specified otherwise herein.

B. Schedule Calculations and Settings:

1. Maintain open-ended activities as non-critical.
2. All project schedule files shall be updated with actual progress using retained logic prior to submission. Progress override is prohibited.
3. Start-to-Start lag shall be calculated from Early Start.
4. Define critical activities as Longest Path providing it is a continuous path emanating from the Data Date to project completion. Otherwise, use total float less than or equal to zero days.
5. Compute total float as finish float.
6. Relationship Lag shall be calculated based on the Predecessor Activity Calendar.
7. Use Remaining Duration to ascertain activity progress and not percent complete.

C. Schedule Diagnostics: All Project Schedules shall be calculated and analyzed then corrected for all open ended and dangling activities, out of sequence progress and

associated schedule corrections as applicable. No activities shall be progressed beyond the Data Date.

3.4 SPECIAL SCHEDULE REPORTS

A. At times and within reason, the RPR may direct the Contractor to develop special reports as needed.

END OF SECTION 01 32 13

SECTION 01 32 23 – FIELD ENGINEERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Conditions/Provisions of the Contract, including Contractual Conditions and other Division 1 Specification Sections, apply to this Section.

B. See Civil specification for additional field engineering requirements.

1.2 SUMMARY

A. General: This Section specifies administrative and procedural requirements for field-engineering services including, but not limited to, the following:

1. Land survey work.
2. Building Layout
3. As-Built documentation

1.3 SUBMITTALS

A. (SD-13) Certificates: Submit a certificate signed by the land surveyor or professional engineer certifying the location and elevation of improvements.

B. (SD-23) Final Property Survey and As-Built documentation Survey: Submit 2 paper copies, 1 mylar and and CD/DVD of AutoCAD & PDF files of the final property survey (42"x30" format).

1.4 QUALITY ASSURANCE

A. Surveyor Qualifications: Engage a land surveyor registered in the State of Florida to perform required land-surveying services.

B. Engineer Qualifications: Engage an engineer of the discipline required, licensed in the State of Florida to perform required engineering services.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Identification: The Contractor will be required to establish its own Project control points.

B. Verify layout information shown on the Drawings, in relation to the property survey and existing benchmarks, before proceeding to lay out the Work. Locate and protect existing benchmarks and control points. Preserve permanent reference points during construction.

1. Do not change or relocate benchmarks or control points without prior written approval of the RPR. Promptly report lost or destroyed reference points or requirements to relocate reference points because of necessary changes in grades or locations.

2. Promptly replace lost or destroyed Project control points utilizing the original survey control points.

C. Establish and maintain a minimum of 2 permanent benchmarks on the site, referenced to data established by survey control points.

1. Record benchmark locations, with horizontal and vertical data, on Project As-Built Documents.

D. Existing Utilities and Equipment: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction.

1. Prior to construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping. Document the information on the As-Built Documents.

3.2 PERFORMANCE

A. Work from lines and levels established by the contract documents. Establish benchmarks and markers to set lines and levels at each story of construction and elsewhere as needed to locate each element of the Project. Calculate and measure required dimensions within indicated or recognized tolerances. Do not scale Drawings to determine dimensions.

1. Advise entities engaged in construction activities of marked lines and levels provided for their use.

2. As construction proceeds, check every major element for line, level, and plumb.

B. Surveyor's Log: Maintain a surveyor's log of control and other survey work. Make this log available for reference to the RPR and the Designer.

1. Record deviations from required lines and levels, and advise the RPR when deviations that exceed indicated or recognized tolerances are detected. On Project As-Built Drawings, record deviations that are accepted and not corrected.

C. Site Improvements: Locate and lay out site improvements, including pavements, stakes for grading, fill and topsoil placement, utility slopes, and invert elevations.

D. Building Lines and Levels: Locate and lay out batter boards for structures, building foundations, column grids and locations, floor levels, and control lines and levels required for mechanical and electrical work.

E. Existing Utilities: Furnish information necessary to adjust, move, or relocate existing structures, utility poles, lines, services, or other appurtenances located in or affected by construction. Coordinate with the appropriate Utility and the local Authorities Having Jurisdiction.

F. As-Built Documents: All concealed and underground utilities, equipment, foundations or other permanent conditions shall be surveyed and documented on the As-Built Documents. This includes all discovered conditions. All shall be tied to permanent benchmarks showing horizontal and vertical data. GPS coordinates are to be provided for all beginning/end points and changes in direction. See Project Close-out 017800 for all As-built requirements.

1. Recording: At Substantial Completion, have the final property survey recorded by or with local governing authorities as the official "property survey."

END OF SECTION 01 32 23

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SECTION 01 32 33 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Conditions/Provisions of Contract, including Contractual Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes: construction video

1.3 SUBMITTALS

A. Submit two Recordable Discs (CD-R, DVD ± R) of the entire construction site prior to the commencement of any work. Video format shall be compatible with the latest release of Windows Media Player. The discs shall be reviewed and approved by the RPR prior to the commencement of construction activity.

B. Submit two recordable discs (CD-R, DVD+R) of monthly status aerial photo of overall site/construction building

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.1 PRE-CONSTRUCTION RECORDABLE DISCS

A. Before starting construction, record video of the site and surrounding properties from different points of view as selected by the RPE and A/E.. Record pre-existing conditions of the site and abutting properties obtained from several perspectives. Provide narrative describing the vantage point and area being recorded.

1. Take videos in sufficient number to show existing conditions adjacent to the property before starting work.

2. Take videos of existing improvement adjoining the property in sufficient detail to record accurately the physical conditions at the start of construction.

END OF SECTION 01 32 33

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SECTION 01 33 23 - SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and General Conditions/Provisions of Contract, including Contractual Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY:

A. Section includes administrative and procedural requirements for submittal of Shop Drawings, Product Data and Samples to verify that products, materials and systems proposed for use comply with provisions of the Contract Documents.

B. Shop Drawings include, but are not limited to, the following:

1. Fabrication Drawings.
2. Installation Drawings.
3. Setting diagrams.
4. Shop-work manufacturing instructions.
5. Templates and patterns.
6. Schedules.
7. Design mix formulas.
8. Coordination Drawings.

C. Product Data include, but are not limited to, the following:

1. Manufacturer's product Specifications.
2. Manufacturer's installation instructions.
3. Standard color charts.
4. Catalog cuts.
5. Roughing-in diagrams and templates.
6. Standard wiring diagrams.
7. Printed performance curves.
8. Operational range diagrams.
9. Mill reports.
10. Standard product operating and maintenance manuals.
11. Safety Data Sheets (SDS) Previously MSDS.

D. Samples include, but are not limited to, the following:

1. Partial Sections of manufactured or fabricated components.
2. Small cuts or containers of materials.
3. Complete units of repetitively-used materials.
4. Swatches showing color, texture and pattern.
5. Color range sets.

6. Components used for independent inspection and testing.

E. Administrative Submittals: Refer to other Division 1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:

1. Schedule of Submittals
2. Permits.
3. Applications for payment.
4. Performance and payment bonds.
5. Insurance certificates.
6. Listing of subcontractors.
7. Contractor's construction schedule.
8. Progress Schedules
9. Progress reports.

1.3 SUBMITTAL PROCEDURES:

A. Coordination: Coordinate preparation and processing of submittals with performance of the Work.

1. Contractor shall submit Schedule of Submittal to the RPR, ten days after NTP.
2. Contractor shall review submittals before submitting to the RPR (Resident Project Representative). Transmit each submittal to the RPR sufficiently in advance of scheduled performance of related construction activities to avoid delay, but in no case later than thirty (30) days after the Notice to Proceed. If any submittals will be delayed, inform the RPR in writing giving reasons for the delay and a revised submittal schedule. Delays will be subject to RPR's approval. No extension of time will be authorized because of a Contractor's failure to transmit submittals to the RPR sufficiently in advance of the Work to permit processing.
3. The RPR and A/E will review all Administrative Submittals. The RPR will review all other submittals for conformance with the Contract Documents prior forwarding the submittals to the A/E.
4. Request for payment of stored materials will not be considered until submittals have been received and approved by the RPR.
5. Transmit submittals to the RPR to prevent delays. The Contractor is responsible for delays accruing directly or indirectly from submission or resubmission of submittal date.
6. Coordinate each submittal with other submittals and related activities that require sequential activity including:

   a. Testing.
   b. Purchasing.
   c. Fabrication.
   d. Delivery.

7. Coordinate transmittal of different types of submittals for the same element of the Work and different elements of related parts of the Work so that processing will not be delayed by the RPR's and A/E's need to review submittals concurrently for coordination.

    a. The RPR and A/E reserve the right to withhold action on a submittal requiring coordination with other submittals until related submittals are delivered to the RPR and A/E.

8. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for re-submittals.

    a. Allow Fourteen (14) days for the RPR and A/E's initial review of each submittal. Where processing must be delayed to permit coordination with subsequent submittals, allow additional time. The RPR will advise the Contractor promptly when a submittal being processed must be delayed for coordination.
    b. Where necessary to provide an intermediate submittal between the initial and final submittals, process the intermediate submittal in the same manner as the initial submittal. Allow fourteen (14) days for reprocessing each submittal.
    c. No extension of time will be authorized because of a Contractor's failure to transmit submittals to the RPR sufficiently in advance of the Work to permit processing.

B. Submittal Preparation - Division 2 through 49: Place a permanent label or title block on each submittal for identification, and submit the information in Submittal Binders. The Contractor has the option to provide Submittals in electronic (PDF) format for the Contractor's own uses, but if hard copies are submitted the specified number of hard copy submittals shall be met. PDF files will be required for all O&M and Close-out documents. The PDF file shall be enabled for Adobe Reader's Comment and Markup functionality. All stamps and markings described herein shall be electronically duplicated or added before scanning. The PDF files shall be transmitted / uploaded to an agreed to Cloud Share file service to the RPR.

1. Binders shall be identified using CSI Divisions and Classification of work, as follows:

    a. Architectural- (Divisions 02-15) White
    b. Mechanical- (Divisions 21-23) Green or Red
    c. Electrical – Power (Divisions 25-26) Black
    d. Electrical – Systems (Divisions 27-28) Blue
    e. Civil - (Divisions 31-35) Yellow

2. Place a permanent label or title block on each submittal for information.
3. Indicate the name of the firm or entity that prepared each submittal on the label or title block.
4. Provide a space approximately 4 inches by 5 inches on the label or adjacent to the title block to record the Contractor's review and approval markings and the action taken by the RPR and Designer.

5. Include the following information on the label for processing and recording action taken.

    a. Project name.
    b. Date.
    c. Name and address of RPR.
    d. Name and address of A/E.
    e. Name and address of Contractor.
    f. Name and address of subcontractor.
    g. Name and address of supplier.
    h. Name of manufacturer.
    i. Number and title of appropriate Specification Section.
    j. Drawing number and detail references, as appropriate.
    k. Similar definitive information as necessary.

6. Stamp each page (sheet) of the submittal with the Contractor's certification statement, or other approval statement, as follows:

    "I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated in the work, is in compliance with the Contract Documents, can be installed in the allocated spaces, and is submitted for review by the RPR and A/E.

    Certified by Submittal Reviewer_____. Date:_____"

    a. Sign the certifying statement or approval statement. The signatures shall be in original ink. Stamped or photocopied signatures are not acceptable.

7. Provide additional tabs (blank sections) in each manual for future submittals.

C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to RPR, as indicated, by use of a transmittal form. Submittals received from sources other than the Contractor will be returned to the sender without action. Electronic transmittals must have descriptive subject lines for ease of retrieval. The transmittal form should be the first page in the attached PDF.

1. Record relevant information and requests for data on the transmittal form. On the form, or an attached separate sheet, call attention to deviations from requirements of the Contract Documents, including minor variations and limitations.
2. Include the Contractor's signed certification stating that information submitted complies with requirements of the Contract Documents.
3. Prepare a draft of a transmittal form and submit it to the OAR review and acceptance. Provide places on the form for the following information:

    a. Project name.
    b. Date.

c. Destination (To:).
d. Source (From:).
e. Names of subcontractor, manufacturer and supplier.
f. Category and type of submittal.
g. Submittal purpose and description.
h. Submittal and transmittal distribution record.
i. Remarks.
j. Signature of transmitter.

1.4 COST OF HARD COPY SUBMITTALS: IF REQUIRED BY OWNER:

1. The contractor shall pay delivery and return, postage, expedited service delivery FEDX, UPS and or Courier services if Hard copy submittals is the selected method of review of submittals.

1.5 SPECIFIC SUBMITTAL REQUIREMENTS:

A. Shop Drawings: Submit newly prepared information, drawn to accurate scale. **DO NOT REPRODUCE CONTRACT DOCUMENTS OR COPY STANDARD PRINTED INFORMATION AS THE BASIS OF SHOP DRAWINGS. USE OF DRAWINGS WITH THE ARCHITECTS NAME AND OR A/E BORDER SHEET IS PROHIBETED.**

1. Include the following information on Shop Drawings:

   a. Dimensions.
   b. Identification of products and materials included.
   c. Compliance with specified standards.
   d. Notation of coordination requirements.
   e. Notation of dimensions established by field measurement.
2. Submit Coordination Drawings where required for integration of different construction elements. Show construction sequences and relationships of separate components where necessary to avoid conflicts in utilization of the space available.
3. The Contractor shall prepare drawings to LOD 400 or greater Per AIA G202-2013.
4. Encircle, identify with arrow, or otherwise indicate deviations from the Contract Documents on the Shop Drawings.

   a. DO NOT USE COLORED HIGHLIGHTERS TO INDICATE SELECTIONS.

5. Do not allow Shop Drawing copies which do not have an appropriate final stamp or other marking indicating action taken by the General Contractor, RPR and A/E to be used for construction.
6. Except for templates, patterns and similar full-size Drawings, submit Shop Drawings on sheets at least 8-1/2" x 11" but no larger than 30" x 42". Shop drawings submitted as PDF files shall be *generated full size of the original and not scale to fit.*
7. Submittals may be in electronic format or if submitting in paper format, submit a sufficient number of copies to enable the County, A/E and the RPR to retain 4 copies of each required Product Data submittal; submit two (2) additional copies where copies are required for operating and maintenance manuals. The RPR will

return the other marked copies with the action taken and corrections or modifications required. One (1) print of each drawing larger than 11” x 17” for review will be returned to the Contractor.

8. Leave a blank area, approximately 4 inches by 2.5 inches, near the title block for the RPR’s and A/E ’s review stamp in print.

B. Product Data: Collect Product Data into a single submittal for each element of construction or system.

1. Encircle, identify with arrow, each copy to show which choices and options are applicable to the Project.

   a. Do not use colored highlights to indicate selection.

2. Where Product Data has been printed to include information on several similar products, some of which are not required for use on the Project, or are not included in this submittal, mark copies to clearly indicate which information is applicable.

3. Where Product Data must be specially prepared for required products, materials or systems, because standard printed data are not suitable for use, submit as "Shop Drawings" not “Product Data."

4. Include the following information in Product Data:

   a. Manufacturer's printed recommendations.
   b. Compliance with recognized trade association standards.
   c. Compliance with recognized testing agency standards.
   d. Application of testing agency labels and seals.
   e. Notation of dimensions verified by field measurement.
   f. Notation of coordination requirements.

5. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

6. Submittals may be in electronic format or if submitting in paper format, submit a sufficient number of copies to enable the County and the RPR to retain 4 copies of each required Product Data submittal; submit two (2) additional copies where copies are required for operating and maintenance manuals. The RPR will return the other marked copies with the action taken and corrections or modifications required.

   a. Unless the RPR and or A/E observes noncompliance with provisions of the Contract Documents or requires re-submittal for other reasons, the initial submittal may serve as the final submittal.

7. Furnish copies of final Product Data submittal to manufacturers, subcontractors, suppliers, fabricators, installers, governing authorities and others as required for performance of the construction activities. Show distribution on transmittal forms.

    a. Do not proceed with installation of materials, products and systems until a copy of Product Data applicable to the installation is in the installer's possession.
    b. Do not permit use of unmarked copies of Product Data in connection with construction.

C. Samples: Submit Samples physically identical with the material or product proposed for use; submit full-size, fully fabricated Samples, cured and finished in the manner specified.

1. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match Designers' Sample where so indicated. Include the following information:

    a. Generic description of the Sample.
    b. Size limitations.
    c. Sample source.
    d. Product name or name of manufacturer.
    e. Compliance with recognized standards.
    f. Compliance with governing regulations.
    g. Availability.
    h. Delivery time.

2. Submit three samples (sets); one set will be returned marked with the action taken. The RPR and A/E will each retain copies.

D. Operating and Maintenance Manuals: Operating and maintenance manuals shall be initially submitted for review at the appropriate 30 percent completion stage of Work under these Sections. The manuals will be reviewed and returned to the Contractor. Corrections shall be made before submittal of the manuals at Project Close-out.

E. In order to facilitate review of product data and shop drawings, they shall be noted, indicating by cross reference the contract drawing sheet number, note, and specification paragraph numbers, where and what item(s) are used for and where item(s) occur in the contract documents.

1.6 RPR AND OR A/E(S) ACTION:

A. Except for submittals for the record, for information and similar purposes, where action and return on submittals is required or requested, the RPR and A/E will review each submittal, mark with appropriate "action," and where possible return within fourteen (14) days of receipt. Where the submittal must be held for coordination the RPR will so advise the Contractor without delay.

1. Compliance with specified characteristics is the Contractor's responsibility, and not considered part of the RPR or A/E review and indication of action taken.

B. The RPR and or A/E will stamp each submittal sheet or page to be returned with a uniform, self explanatory action stamp appropriately marked and executed to indicate whether the submittal returned is for unrestricted use (no exceptions taken), final-but-restricted use (as marked), must be revised and resubmitted (use not permitted), or without action (as explained on the transmittal form), or other similar type wording.

C. The RPR’s and or A/E’s review of submittals is for design conformity and general conformance of the contract documents only and does not relieve the Contractor from responsibility for any deviations from the requirements of the Contract Documents. The RPR and or A/E’s review shall not be construed as a complete check nor shall it relieve the Contractor from responsibility for errors of any sort in shop drawings or schedules, of from the necessity of furnishing any work required by the Contract Documents which may have been omitted on the shop drawings. The RPR and or A/Es' review of a separate item shall not indicate review of the complete assembly in which it functions.

1.7 SUBMITTAL BROCHURE BINDERS: Applicable only to hard copy submittals.

A. Brochure Binders: 3-ring, vinyl covered, with clear view insert type cover and spine.

1. Binder Size: 8.5 x 11.0 inches x size (spine) adequate to easily contain the required submittals. Minimum spine size shall be 1-inch, maximum shall be 3-inches. Provide additional binders if the 3-inch size is not sufficient to properly contain submittals.
2. Binder Cover: Binders shall have a clear view, vinyl pocket on the front cover, adequate to hold an 8.5 inch by 11 inch description sheet. The binder shall have a clear view, vinyl spine pocket adequate to hold an 11 inch long description sheet.

B. Binder Contents: Include the following.

1. Cover sheet; cover sheet shall be white with black letters, minimum 11-inches high and full width of spine pocket. See “EXAMPLES” included at end of this Section.
2. First page shall be a copy of the Specification table of contents.
3. Second page shall be a list of project addresses (see “EXAMPLE”).
4. Third page shall be Project information (see “EXAMPLE”).
5. Provide reinforced separation sheets tabbed with appropriate specification reference number.
6. Product data sheets.
7. Shop drawings.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 SCHEDULE OF SUBMITTALS DESCRIPTION (SD) AND SUBMITTAL REGISTER

A. General: The following is a description of each submittal type, specified in other Sections, required for the Project. Include each submittal description (SD) in the Submittal Register included as part of this Section.

1. SD-01: Product Data; submittals that provide calculations, descriptions or other documentation regarding the work.
2. SD-02: Manufacturer's Catalog Data (Product Data); data composed of information sheets, brochures, circulars, specifications and product data, and printed information in sufficient detail and scope to verify compliance with requirements of the Contract Documents.
3. SD-03: Manufacturer's Standard Color Charts (Product Data); preprinted illustrations displaying choices of color and finish for a material or product.
4. SD-04: Shop Drawings; graphic representations which illustrate relationship of various components of the work, schematic diagrams of systems, details of fabrications, layout of particular elements, connections, and other relational aspects of the work.
5. SD-05: Design Data (Shop Drawings); design calculations, mix designs, analyses, or other data written and pertaining to a part of the work.
6. SD-06: Instructions (Product Data); preprinted material describing installation of a product, system, or material, including special notices and Material Safety Data Sheets, if any, concerning impedance, hazards, and safety precautions.
7. SD-07: Schedules (Shop Drawings); a tabular list of data or a tabular listing of locations, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work.
8. SD-08: Statements (Shop Drawings); a document, required of the Contractor, or through the Contractor by way of a supplier, installer, manufacturer, or other lower tier contractor, the purpose of which is to further the quality or orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel, qualifications, or other verification of quality.
9. SD-09: Reports (Product Data); reports of inspection and laboratory tests, including analysis, an interpretation of test results. Each report shall be properly identified. Test methods used and compliance with recognized test standards shall be described.
10. SD-10: Test Reports (Product Data); a report signed by an authorized official of a testing laboratory that a material, product, or system identical to the material, product or system to be provided has been tested in accordance with requirements specified by naming the test method and material. The test report must state the test was performed in accordance with the test requirements; state the test results; and indicate whether the material, product, or system has passed or failed the test. Testing must have been within three years of the date of award of this Contract.
11. SD-11: Factory Test Reports (Shop Drawings); a written report which includes the findings of a test required to be performed by the Contractor or an actual portion of the work or prototype prepared for this project before it is shipped to the job site. The report must be signed by an authorized official of a testing laboratory and must state the test was performed in accordance with the test requirements; state the test

results; and indicate whether the material, product, or system has passed or failed the test.

12. SD-12: Field Test Reports (Shop Drawings); a written report which includes the findings of a test made at the job site, in the vicinity of the job site, or on a sample taken from the job site, on a portion of the work, during or after installation. The report must be signed by an authorized official of a testing laboratory or agency and must state the test was performed in accordance with the test requirements; state the test results; and indicate whether the material, product, or system has passed or failed the test.
13. SD-13: Certificates (Shop Drawings); statements signed by responsible officials of a manufacturer of a product, system, or material attesting that the product, system, or material meet specified requirements. The statements must be dated after the award of this contract, name the project, and list the specific requirements which it is intended to address.
14. SD-14: Warranties (Product Data); statements signed by responsible officials of a manufacturer of a product, system, or material attesting that the product, system, or material will perform its specific function over a specified duration of time. The statement must be dated, and include the name of the project, the Owner's name, and other pertinent data relating to the warranty.
15. SD-15: Samples; samples, including both fabricated and non-fabricated physical examples of materials, products, and units of work as complete units or as portions of units of work.
16. SD-16: Color Selection Samples (Samples); samples of the available choice of colors, textures, and finishes of a product or material, presented over substrates identical in texture to that proposed for the work.
17. SD-17: Sample Panels (Samples); an assembly constructed at the project site in a location acceptable to the RPR and using materials and methods to be employed in the work; completely finished; maintained during construction; and removed at the conclusion of the work or when authorized by the RPR. A type of sample.
18. SD-18: Sample Installations (Samples); a portion of an assembly or material constructed where directed and, if approved, retained as a part of the work.
19. SD-19: Records; documentation to ensure compliance with an administrative requirement or to establish an administrative mechanism.
20. SD-20: Operating and Maintenance Manuals (Records); data intended to be incorporated in an Operating and Maintenance Manual
21. SD-21: Test Reports of Existing Conditions; a document describing existing conditions and operations of systems and components prior to the start of any work. Testing shall be held in the presence of the RPR and A/E. Provide copies of the test reports to the RPR and A/E.
22. SD-22: Demonstrations; physical operation of equipment and systems by factory authorized representatives to demonstrate to the Owner's facility personnel proper operation of systems. Provide all required documentation that certified completed demonstration.
23. SD-23: As-Built Drawings; delineated documentation accurately depicting final installation location of components and systems of the building.

24. SD-24: Shop Drawings in Electronic format; when drawings are required all materials shall be provided in AUTOCAD latest release and PDF on a CD/DVD.
25. SD-25: Coordination Drawings; special type of Shop Drawing that show the relationship and integration of different construction elements that require close and careful coordination during fabrication or during installation to fit in the restricted space provided or to function as intended.
26. SD-26: Certification of Approved Disposal of Hazardous Materials; certification signed by the Contractor indicating legal disposal of hazardous materials.
27. SD-27: CD/DVD Training Tape; taped training instructions to be used by the Owner's personnel.
28. SD-28: Spare Parts Memo; a listing of spare parts required; refer to Section 01 70 00 Execution and Closeout Requirements.
29. SD-29: UL Letter of Finding; a document from Underwriters Laboratories Inc., attesting compliance with UL's standard for connection to an existing lightning protection system; a document from Underwriters Laboratories Inc., attesting compliance with UL's standard for UL Master Label.
30. SD-30: Equipment Check-Out Memos; document signed by the manufacturer's authorized representative stating that equipment has been installed and is operating in accordance with the manufacturer's specifications; refer to Section 01 70 00 Execution and Closeout Requirements.

B. Submittal Register: The Contractor is to maintain an accurate updated submittal register and will bring this register to each scheduled JCM with the RPR and the A/E. This register should include the following items:

1. Submittal-Description and Number assigned.
2. Date to RPR
3. Date to A/E.
4. Date returned to RPR from A/E.
5. Date returned to Contractor from A/E.
6. Submittal Status.
7. Date of Re-submittal and Return (as applicable).
8. Date material released (for fabrication).
9. Projected date of fabrication.
10. Projected date of delivery to site.
11. Status of submittal.

SUBMITTAL REGISTER (PART A) - Headings

Contract Number:

Spec. Section Number	Submittal Description (SD) Number	Spec. Paragraph Number	RPR Reviewer	A/E Reviewer	Trans Control Number	Planned Submittal Date
(A)	(B)	(C)	(D)	(E)	(F)	(G)

SUBMITTAL REGISTER (PART B) - Headings

Location: Contractor:

Action Code	Date of Action	Date Rec'd from Contr.	Date FWD to other Reviewer	Date Rec'd from other Reviewer	Action Code	Date of Action	Mailed to Cont.	Remarks
(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)	(P)

Project Number: C 19-2811 AP Design of Satellite Concourse "C"

Project Name: DESTIN-FORT WALTON BEACH ARIPORT

Spec. Section Number	Submittal Description & (SD) Number	Spec. Paragraph Number	Received Date	RPR Review	A/E Review	Return Date
01 29 73	SCHEDULE OF VALUES SD-07	1.3				
01 31 13	SD-07, SD-25	1.4				
01 32 13	SD-07	1.5				
01 32 23	SD-13, SD-23	1.3				
01 32 33	PHOTOGRAPHIC	1.3				
01 42 00	REFRENCES	1.6				
01 45 00	SD-12	1.5				
01 45 16	SD-12, SD-13	1.3				
01 45 29	SD-12, SD-13	1.7				

Project Number: C 19-2811 AP Design of Satellite Concourse "C" Project Name: DESTIN-FORT WALTON BEACH ARIPORT						
Spec. Section Number	Submittal Description & (SD) Number	Spec. Paragraph Number	Received Date	RPR Review	A/E Review	Return Date
01 50 00	TEMPORARY FACILITIES SD-01, SD-04, SD-07, SD-08, SD-12, SD-25	1.3				
01 60 00	SD-01	1.4				
01 73 29	CUTTING AND PATCHING	1.4				
01 79 00	SD-27	1.3, 1.4				
02 41 41	SD-7, SD-8	1.6				
03 30 00	SD-1 Product Data SD-05 Design Mixtures SD-04 Shop Drawings SD-04 Construction Joint Layout SD-15 Samples	1.4, 1.5				
04 22 00	SD-1 Product Data SD-04 Shop Drawings SD-15 Samples SD-13 Qualification Data SD-13 Material Certificates SD-05 Design Mixtures	1.5, 1.6				
05 12 00	SD-4, SD-5, SD-10, SD-13	1.6, 1.7				
05 21 00	SD-1 Product Data SD-04 Shop Drawings SD-13 Qualification Data SD-13 Welding Certificates SD-13 Mill Certificates	1.4, 1.5				

Project Number: C 19-2811 AP Design of Satellite Concourse "C" Project Name: DESTIN-FORT WALTON BEACH ARIPORT						
Spec. Section Number	Submittal Description & (SD) Number	Spec. Paragraph Number	Received Date	RPR Review	A/E Review	Return Date
	SD-13 Engineering Analysis SD-12 Field Quality-Control Reports					
05 31 00	SD-1 Product Data SD-04 Shop Drawings SD-13 Welding Certificates SD-13 Product Certificates SD-10 Product Test Reports SD-10 Evaluation Reports SD-12 Field Quality-Control Reports	1.3, 1.4				
05 40 00	SD-1, SD-2, SD-4, SD-5	1.6				
05 50 00	SD-1 Product Data, SD-4 Shop drawings.	1.5				
05 81 01	SD-1, SD-2, SD-4, SD-14, SD-15	1.3				
06 10 00	SD-2, SD-13	1.4				
06 22 00	SD-1, SD-2, SD-4, SD-10, SD-13, SD-16	1.4				
06 60 16	SD-1, SD-2, SD-4, SD-10, SD-15, SD-16	1.3				
07 21 00	SD-1, SD-2	1.04				
07 22 16	SD-1, SD-2, SD-4, SD-5, SD-13, SD-15	1.5				
07 26 16	SD-1, SD-2, SD-10, SD-15	1.03				
07 27 00	SD-1, SD-2, SD-10	1.3				

Project Number: C 19-2811 AP Design of Satellite Concourse “C” Project Name: DESTIN-FORT WALTON BEACH ARIPORT						
Spec. Section Number	Submittal Description & (SD) Number	Spec. Paragraph Number	Received Date	RPR Review	A/E Review	Return Date
07 27 29	SD-1, SD-2, SD-4, SD-10, SD-13	1.4, 1.5				
07 54 00	SD-1, SD-2, SD-4, SD-5, SD-12, SD-13, SD-14, SD-15, SD-20	1.4				
07 62 00	SD-1, SD-2, SD-4, SD-8, SD-18	1.4, 1.5				
07 71 00	SD-01, SD-02.SD-04, SD-10, SD-14	1.4				
07 72 00	SD-2, SD-4, SD-25	1.03				
07 84 20	SD-1, SD-2, SD-04, SD-13, SD-10	1.4				
07 92 00	SD-1, SD-2, SD-12, SD-14, SD-15	1.3, 1.10				
08 10 00	SD-1, SD-2, SD-4, SD-5, SD7, SD-10	1.5				
08 31 13	SD1, SD-2, SD-4, SD-7	1.03				
08 42 29	SD-1, SD-2, SD-4, SD-5, SD-7, SD-13, SD-14, SD-20	1.4, 1.5				
08 44 13	SD-1, SD-2, SD-4, SD-10, SD-11, SD-12, SD-13, SD-15	1.4, 1.7				
08 71 00	SD-1, SD-2, SD-7, SD-10, SD-14, SD-20	1.6, 1.9				
08 80 00	SD-1, SD-2, SD-9, SD-14, SD-15	1.5, 1.6				
08 90 00	SD-1, SD-2, SD-4, SD-11, SD-13, SD-15	1.5				
09 21 16	SD-1, SD-4, SD-10, SD-18	1.5				
09 21 18	SD-1, SD-10	1.5				
09 22 16	SD-1, SD-4, SD-5	1.2				

Project Number: C 19-2811 AP Design of Satellite Concourse “C” Project Name: DESTIN-FORT WALTON BEACH ARIPORT						
Spec. Section Number	Submittal Description & (SD) Number	Spec. Paragraph Number	Received Date	RPR Review	A/E Review	Return Date
09 22 26	SD-1, SD-2, SD-5, SD-13, SD-15	1.4, 1.7				
09 24 23	SD-1, SD-4, SD-5, SD-6, SD-17	1.4				
09 30 00	SD-1, SD-15	1.4				
09 51 13	SD-1, SD-4, SD-13, SD-15, SD-29	1.3, 1.6				
09 65 19	SD-1, SD-4, SD-12, SD-14, SD-15	1.2, 1.7				
09 70 00	SD-1, SD-2, SD-3, SD-14, SD-16	1.4				
09 81 00	SD-1	1.5				
09 91 00	SD-1, SD-08, SD-15	1.4, 1.11				
09 96 53	SD-1, SD-10, SD-14, SD-16	1.4				
10 14 16	SD-1, SD-4, SD-16	1.4				
10 21 13	SD-1, SD-2, SD-4, SD-10, SD-14, SD-15	1.5				
10 22 00	SD-1, SD-2, SD-4, SD-10, SD-14, SD-15, SD-20	1.6				
10 26 23	SD-1, SD-2, SD-4, SD-16	1.3				
10 28 13	SD-1, SD-4, SD-7, SD-14, SD-20	1.2				
10 43 13	SD-1, SD-2, SD-4, SD-7, SD-15, SD-20	1.3, 1.4				
10 44 14	SD-1, SD-2, SD-20	1.4				
10 50 20	SD-1, SD-2, SD-4, SD-5, SD-16	1.5				
12 48 16	SD-1, SD-2, SD-4, SD-15, SD-20	1.4,1.5				
22 05 00	SD-1 Product Data	1.5				
22 05 16	SD-1 Product Data	1.4				

Project Number: C 19-2811 AP Design of Satellite Concourse “C” Project Name: DESTIN-FORT WALTON BEACH ARIPORT						
Spec. Section Number	Submittal Description & (SD) Number	Spec. Paragraph Number	Received Date	RPR Review	A/E Review	Return Date
22 05 18	SD-1 Product Data	1.3				
22 05 19	SD-1 Product Data SD-20 O&M	1.3, 1.4, 1.5				
22 05 23	SD-1 Product Data	1.4				
22 05 29	SD-1 Product Data SD-24 Shop Drawings SD-13 Welding Certificates	1.5, 1.6				
22 05 53	SD-1 Product Data	1.3				
22 07 19	SD-1 Product Data SD-04 Shop Drawings	1.3				
22 11 16	SD-1 Product Data SD-04 Shop Drawings	1.4,1.5				
22 11 19	SD-1 Product Data SD-04 Shop Drawings	1.4				
22 13 16	SD-1 Product Data SD-04 Shop Drawings	1.4				
22 13 19	SD-1 Product Data SD-20 O&M	1.4, 1.5				
22 42 13.13	SD-1 Product Data SD-20 O&M	1.3, 1.4				
22 42 16.13	SD-1 Product Data SD-04 Shop Drawings SD-20 O&M	1.3, 1.4				
22 42 16.16	SD-1 Product Data SD-20 O&M	1.3, 1.4				
23 00 10	SD-04 Shop Drawings	1.7				
23 05 00	SD-1 Product Data	1.4				

Project Number: C 19-2811 AP Design of Satellite Concourse "C"

Project Name: DESTIN-FORT WALTON BEACH ARIPORT

Spec. Section Number	Submittal Description & (SD) Number	Spec. Paragraph Number	Received Date	RPR Review	A/E Review	Return Date
23 05 19	SD-1 Product Data	1.3				
23 05 23	SD-1 Product Data	1.4				
23 05 29	SD-1 Product Data	1.4				
23 05 48	SD-1 Product Data SD-04 Shop Drawings	1.6				
23 05 53	SD-1 Product Data	1.3				
23 05 93	SD-13 Qualification Data SD-12 TAB Reports	1.4				
23 09 00	SD-1 Product Data SD-04 Shop Drawings	1.6				
23 31 13	SD-1 Product Data SD-04 Shop Drawings	1.3				
23 33 00	SD-1 Product Data SD-04 Shop Drawings	1.3				
23 34 16	SD-1 Product Data SD-04 Shop Drawings	1.3				
23 36 00	SD-1 Product Data SD-04 Shop Drawings	1.4				
23 37 13	SD-1 Product Data	1.3				
23 41 00	SD-1 Product Data	1.4				
23 74 13	SD-1 Product Data SD-04 Shop Drawings	1.4				
23 07 00	SD-1 Product Data	1.3				
26 05 19	SD-1, SD-7	1.4				

Project Number: C 19-2811 AP Design of Satellite Concourse “C” Project Name: DESTIN-FORT WALTON BEACH ARIPORT						
Spec. Section Number	Submittal Description & (SD) Number	Spec. Paragraph Number	Received Date	RPR Review	A/E Review	Return Date
26 05 26	SD-1	1.3				
26 05 29	SD-1, SD-7	1.3				
26 05 33	SD-1	1.4				
26 05 44	SD-1	1.3				
26 24 13	SD-1, SD-4	1.3				
26 24 16	SD-1, SD-4	1.3				
26 27 26	SD-1, SD-4, SD-15	1.4				
26 28 16	SD-1, SD-4	1.4				
26 36 00	SD-1, SD-4	1.3				
26 51 00	SD-1, SD-4, SD-8	1.3				
27 05 26	SD-1	1.6				
27 05 50		1.5				
27 10 00	SD-4	1.5				
27 10 10		1.6				
27 10 15		1.6				
27 11 00		1.5				
27 15 16		1.4				
27 21 00		1.6				
27 42 16		1.5				
28 05 00		1.5				

Project Number: C 19-2811 AP Design of Satellite Concourse “C” Project Name: DESTIN-FORT WALTON BEACH ARIPORT						
Spec. Section Number	Submittal Description & (SD) Number	Spec. Paragraph Number	Received Date	RPR Review	A/E Review	Return Date
28 05 13		1.4				
28 13 00		1.5				
28 23 00		1.7				
28 31 00		1.5				
31 31 16	SD-1,SD-02, SD-12, SD-13	1.4				
32 13 13 P-610	SD-2, SD-04, SD-05, SD-07, SD-08, SD-09, SD-10, SD-12, SD-13					
32 31 13 F-162	SD-02, SD-04	162-2.1, 162-2.2, 162-2.3, 162-2.5, 162-2.6, 162-2.7, 162-2.8				
32 91 13		1.3				
32 92 00	SD-01, SD-02, SD-06, SD-07, SD-08	1.4				
32 93 00	SD-01, SD-02, SD-06, SD-07, SD-08	1.8				
33 11 00	SD-02, SD-04, SD-23, SD-24	1.3, 2.1, 3.6				
33 12 16	SD-02, SD-04, SD-23, SD-24	1.4, 2.3, 2.4 & 2.6				
33 41 00 D-701	SD-02, SD-04, SD-23, SD-24	D-701-2.1, D-701-2.2, D-701-2.3				
33 49 00 D-751	SD-02, SD-04, SD-23, SD-24	751-2.2, 751-2.3, 751-2.4, 751-2.6,				

Project Number: C 19-2811 AP Design of Satellite Concourse “C” Project Name: DESTIN-FORT WALTON BEACH ARIPORT						
Spec. Section Number	Submittal Description & (SD) Number	Spec. Paragraph Number	Received Date	RPR Review	A/E Review	Return Date
		751-2.8				
FDOT 570 & 981	SD-13	570-2, 981-2, 981-3 & 981-4				
FDOT 570 & 982	SD-13	570-2, 982-1 & 982-2				

PROJECT ADDRESSES

OWNER:

RPR:

ARCHITECT:

STRUCTURAL ENGINEER:

MECHANICAL ENGINEER:

ELECTRICAL ENGINEER:

FIRE PROTECTION ENGINEER:

CIVIL ENGINEER:

LANDSCAPE ARCHITECT

GENERAL CONTRACTOR:

SUBCONTRACTORS:

PROJECT INFORMATION

NOTE TO CONTRACTOR: Fill in the blanks below and insert one copy as page number 3 in each Submittal Brochure.

Project Number and Name: IITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE "C"

Contractor's Job Superintendent: _____ Job Phone No.: _____

Subcontractor's Job Superintendent: _____ Job Phone No.: _____

Date Project Bids: _____

Official Project Starting Date: _____

Date Technical Information Brochures Submitted: _____

Days Allowed for Construction: _____

Target Completion: _____

The following items shall be completed before date of Contractor's Request for Substantial Completion:

Date of Performance Verification Information Submitted: _____

Date Check-Out Memos Submitted: _____

Date Written Operating Instructions Submitted: _____

Date Maintenance Information Submitted: _____

Date Marked-Up Progress Prints Submitted: _____

Date As-Built Corrections Submitted: _____

Date Contractor's Instruction Conference with Owner: _____

Date Contractor's Request for Acceptance: _____

Date Project Accepted: _____

OKALOOSA COUNTY

DESTIN-FORT WALTON BEACH AIRPORT

ITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE “C”

ELECTRICAL SUBMITTAL BROCHURES

OKALOOSA COUNTY

DESTIN-FORT WALTON BEACH AIRPORT

ITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE "C"

SYSTEMS SUBMITTAL BROCHURES

OKALOOSA COUNTY

DESTIN-FORT WALTON BEACH AIRPORT

ITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE “C”

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SUBMITTAL

BROCHURES

OKALOOSA COUNTY

DESTIN-FORT WALTON BEACH AIRPORT

ITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE “C”

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SUBMITTAL

BROCHURES

END OF SECTION 01 33 23

SECTION 01 42 00 - REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Conditions/Provisions of the Contract, including Contractual Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. General: Basic contract definitions are included in the Conditions of the Contract.

B. "Approved": The term "approved," when used in conjunction with the RPR’s or A/E(s) action on the Contractor's submittals, applications, and requests, is limited to the RPR's or Designer duties and responsibilities as stated in the Conditions of the Contract.

C. "Directed": Terms such as "directed," "requested," "authorized," "selected," "approved," "required," and "permitted" mean directed by the RPR, requested by the RPR, and similar phrases.

D. "Furnish": The term "furnish" means to supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

E. "Indicated": The term "indicated" refers to graphic representations, notes, or schedules on the Drawings; or to other paragraphs or schedules in the Specifications and similar requirements in the Contract Documents. Terms such as "shown," "noted", "scheduled," and "specified" are used to help the user locate the reference. Location is not limited.

F. "Install": The term "install" describes operations at the Project site including the actual unloading, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

G. "Installer": An installer is the Contractor or another entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier, who performs a particular activity including installation, erection, application, or similar operations. Installers are required to be experienced in the operations they are engaged to perform.

H. “Manufacturer”: The manufacturer is the individual entity with responsibility for and control of the assembly of the major components.

I. "Project site" is the space available to the Contractor for performing installation activities, either exclusively or in conjunction with others performing work as part of the Project. The extent of the Project site is shown on the Drawings.

J. "Provide": The term "provide" means to furnish and install, complete and ready for the intended use.

K. "Regulations": The term "regulations" includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the industry that control performance of the Work.

1. The term "experienced," when used with the term "installer," means having successfully completed a minimum of 5 previous projects similar in size and scope to this Project; being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.

L. "Testing Agencies": A testing agency is an independent entity engaged by the Owner, to perform specific inspections or tests, either at the Project site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.3 SPECIFICATION FORMAT AND CONTENT EXPLANATION

A. Specification Format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institute's 48-division "MasterFormat" system.

B. Specification Content: These Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be interpolated as the sense requires. Singular words will be interpreted as plural and plural words interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the Text, subjective language is used for clarity to describe responsibilities that must be fulfilled indirectly by the Contractor or by others when so noted.

a. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

1.4 INDUSTRY STANDARDS

A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.

B. Publication Dates: Comply with the standards in effect as of the date of the Contract Documents, unless otherwise indicated.

C. Conflicting Requirements: Where compliance with 2 or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different but apparently equal to the OAR for a decision before proceeding.

1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to the RPR for a decision before proceeding.

D. Copies of Standards: Each entity engaged in installation on the Project must be familiar with industry standards applicable to its installation activity. Copies of applicable standards are not bound with the Contract Documents.

1. Where copies of standards are needed to perform a required installation activity, the Contractor shall obtain copies directly from the publication source and make them available on request.

E. Abbreviations and Names: Trade association names and titles of general standards are frequently abbreviated. Where abbreviations and acronyms are used in the Specifications or other Contract Documents, they mean the recognized name of the trade association, standards-generating organization, authorities having jurisdiction, or other entity applicable to the context of the text provision. Refer to Gale Research Inc.'s "Encyclopedia of Associations," which is available in most libraries.

1.5 GOVERNING REGULATIONS AND AUTHORITIES

A. Copies of Regulations: Obtain copies of the current codes and regulations being utilized by the Authority Having Jurisdiction and retain at the Project site to be available for reference by parties who have a reasonable need.

1.6 SUBMITTALS

A. Permits, Licenses, and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 42 00

SECTION 01 43 39 - VISUAL MOCK-UP REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies full size mock-up requirements of building components to verify material selections, demonstrate aesthetic effects and review construction and workmanship.

B. Visual Mock-up shall be completed prior to commencement of in-place construction.

C. Approved mock-up shall establish the standard by which the Work will be judged.

D. Acceptance of mock-up does not constitute approval of deviations from the Contract Documents in mock-up, unless such deviations are specifically approved by Architect in writing.

E. Retain mock-ups during construction and maintain in an undisturbed condition. Do not demolish alter or remove mock-up until approved by Architect.

F. Mock-up shall be used to demonstrate quality of materials, finish, and workmanship as well as to show compliance with visual criteria.

G. Submit shop drawings prior to fabrication of visual mock-up, showing plan, elevations and details of mock-up.

PART 2 - PRODUCTS

2.1 MATERIALS

A. As specified in individual Specification Sections.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Use the same workers to do work in conjunction with construction of the mock-up as covered by the work of their respective Contracts.

B. Provide a 2-Faced mock-up as indicated complete with the following conditions (All conditions shall be finished with details identical to those proposed for use in the building and as indicated on the drawings).

1. Curtainwall System
2. Exterior curtainwall corner
3. Curtainwall head, Jamb and sill condition
4. Louver Penetration
5. Louver head
6. Roof Edge and Gutter including expansion joints

7. T-flashing transitions
8. Roof section
9. Inside Corner
10. Splice joints
11. Control joints
12. Backer rod/joint installation
13. Building expansion joint
14. Stucco wall panels
15. Restroom wall to floor intersection layout
16. Add additional details as needed based on design
17. Or as noted on specifications and indicated on the drawings

C. Do not use special measures or techniques, which are not representative of those to be used in the building. Finish the various components to show the maximum variation that will exist in the actual building construction between adjacent components.

D. Notify Architect when construction of mock-up begins and when major components are to be installed.

E. Complete the mock-up and obtain Architect's approval of each component of the mock-up prior to fabrication or purchase of products for the Project.

3.2 BUILDING EXTERIOR WALL

A. Fabricate and erect the above-described visual mock-up of the typical exterior wall condition with one outside corner returning to the window line.

B. Mock-up size: As indicated on drawings.

C. Provide structural steel framework for support of visual mock up. Framework shall be designed by a registered professional or structural engineer licensed in the State where the Project is located.

D. Coordinate with Architect and RPR for location of mock-up on project site. When directed, demolish mock-ups and remove from Project site.

E. Construct mock-up in such a manner that each type of exterior finishes will be demonstrated in a layered fashion from one side to the other. The purpose in the layers is to facilitate the review of the multiple activities that are required to accomplish the final finish.

F. Construct mock-up in phases so that proposed construction methodologies can be observed. Mock-up shall be completely constructed, just as if it were the finished exterior wall section. Wall insulation and interior wall finishes are not required.

G. In addition to specifics in the respective Specification Sections, the mock-up will be reviewed by the RPR and the Architect for the following evaluation purposes:

1. Aesthetic: To review and verify selections made under submittals, as well as to

show compliance with visual criteria. Acceptance criteria is for general and specific aesthetic qualities of construction, and includes, but is not limited to, the following:

a. Tooling of sealants.
b. Color consistency of aluminum window framing.
c. Color and clarity of glass.

2. Installation Execution: To review and verify quality of workmanship, and compliance with Drawings, Specification, and submittals. Acceptance criteria is for general and specific erection, installation, and application qualities of construction, and includes, but is not limited to, the following:
   a. Cold-formed metal framing fabrication and assemblage.
   b. Glazed aluminum wall system fabrication, anchorage/attachment, and installation quality.
   c. Glazing integrity.
   d. Sealant profile consistency and bonding integrity.
   e. Attachment of aluminum composite material panels.
   f. Dimensional tolerances.

3.3 TYPICAL ROOM MOCK-UP

A. Arrange for the construction of a typical room mock-up located in the building, per mutual agreement between RPR and Contractor.

1. Typical Restrooms: At the first installation of a typical public restroom, complete finishes, fixtures and accessories in one restroom module as a visual mock-up.

B. The materials trades Subcontractors shall do all work in conjunction with construction of the mock-up as covered by the work of their respective Contracts.

C. Typical Room mock-up shall be complete with finishes, fixtures and details identical to those proposed for use in the Project. Do not use special measures or techniques, which are not representative of those to be used in the finish work. Finish the various components to show the quality of material and construction that will exist in the actual construction.

D. Typical room mock-up shall be of adequate size to contain all samples and demonstrate quality of materials, finish and workmanship as well as to show compliance with visual criteria. Submit shop drawings to show layout of room prior to construction. Mock-up room shall be constructed as soon as sufficient structure is available to allow installation.

E. Materials or workmanship not approved shall be removed and replaced with acceptable products or workmanship. Fabrication, purchase or installation of materials for the building shall not begin until approved in the mock-up room. OAR's approval of samples will be required on all visual items prior to any contractor's buy- out.

F. Materials installed in the room mock-up shall include an example of all furnished

assemblies, hardware, equipment or accessories required for the Project and shall include, but may not be necessarily limited to the following:

1. Lavatory countertop, complete with sealant, sink, accessories, trim, etc.
2. Hollow Metal Door Frame
3. Door Hardware
4. Porcelain tile floor and wall
5. Ceramic floor and wall material
6. Toilet Compartment complete with partition, side wall, pilaster, door and hardware.
7. Toilet Room Accessories
8. Water closet and trim
9. Urinal and trim
10. Lighting
11. Electrical Devices and Accessories
12. Access Doors or Panels

END OF SECTION 01 43 39

SECTION 01 45 00 - QUALITY CONTROL

PART 1 - GENERAL

1. 1 RELATED DOCUMENTS

A. Drawings and General Conditions/Provisions of Contract, including Contractual Conditions and other Division 1 Specification sections, apply to this section.

1. 2 SUMMARY

A. Section includes: quality control and quality assurance services.

1. Quality control services: inspections, tests, and related actions including reports, performed by independent agencies, governing authorities, and the Contractor. They do not include Contract enforcement activities performed by the RPR and A/E. Unless otherwise specified in the contract documents, all quality control services, inspections, tests and related actions shall be coordinated and provided by Contractor.
2. Quality assurance services: Inspection and testing services to assist the RPR and A/E in the determination of compliance of the Work with the Contract Documents. These services will be provided by the Owner but do not relieve the Contractor of responsibility for compliance with Contract Document requirements or for quality control services.

B. Requirements of this Section relate to customized fabrication, on site construction and installation procedures, not production of standard products.

1. Inspections, test and related actions specified are not intended to limit the Contractor's quality control procedures that facilitate compliance with Contract Document requirements.
2. Requirements to provide quality control services required by the Owner, RPR, A/E, or Authorities Having Jurisdiction are not limited by provisions of this Section.

1. 3 TESTING BY THE OWNER

A. The Owner may engage the services of an independent agency to perform inspections and tests specified as the Owner's responsibilities. The RPR will inform the Contractor of such services.

1. Where the Owner has engaged a testing agency or other entity for testing and inspection of a part of the Work, and the Contract Documents require the Contractor to engage an entity for the same or related element, the Contractor

shall not employ the entity engaged by the Owner, unless otherwise agreed in writing with the Owner.

B. Owner Responsibilities: The Owner may provide inspections, tests and similar quality assurance services to determine whether the Work is in conformance with the requirements of the Contract Documents. Costs for these services are not included in the Contract Price.

1. The Owner may employ and pay for the services of an independent agency, testing laboratory or other qualified firm to perform acceptance and quality assurance testing.
2. The Owner may employ threshold inspection services.

1. 4 CONTRACTOR RESPONSIBILITIES

A. Contractor Responsibilities: Provide inspections, tests and similar quality control services, specified in individual specification sections and required by governing authorities, except where they are specifically indicated to be the Owner's responsibility, or are provided by another identified entity. Costs for these services shall be included in the Contract Price.

1. Testing Agency: Employ and pay an independent agency, to perform specified quality control services.
2. Re-testing: Provide the cost of re-testing where results of required inspections, tests or similar services prove non-compliance with Contract Document requirements.

   a. Provide the cost of re-testing construction revised or replaced.

3. Associated Services: Cooperate with the RPR and with agencies performing required inspections, tests and similar services and provide reasonable auxiliary services as requested. Notify the RPR and the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include but are not limited to the following:

   a. Providing access to the Work and furnishing incidental labor and facilities necessary to facilitate inspections and tests.
   b. Taking adequate quantities of representative samples of materials that require testing or assisting the agency in taking samples.
   c. Providing facilities for storage and curing of test samples, and delivery of samples to testing laboratories.
   d. Providing the agency with a preliminary design mix proposed for use for materials mixes that require control by the testing agency.
   e. Security and protection of samples and test equipment at the Project site.

B. Duties of the Testing Agency: The independent testing agency engaged by the Contractor to perform inspections, sampling and testing of materials and construction specified in individual Specification Sections shall cooperate with the RPR, A/E and Contractor in performance of its duties, and shall provide qualified personnel to perform required inspections and tests.

1. The agency shall notify the RPR, A/E and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. The agency is not authorized to release, revoke, alter or enlarge requirements of the Contract Documents, or approve or accept any portion of the Work.
3. The agency shall not perform any duties of the Contractor.

C. Coordination: The Contractor and each agency engaged by the Contractor to perform inspections, tests and similar services shall coordinate the sequence of activities to accommodate required services with a minimum of delay. In addition, coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.

1. Schedule times for inspections, tests, taking samples, and similar activities. Provide a minimum of one (1) day (excluding weekends and holidays) notification to the RPR and A/E for each inspection, test, sampling, and similar activities.

1. 5 SUBMITTALS

A. (SD-12) The independent testing agency shall submit two (2) certified copies of the written report of each inspection, test or similar service, to the RPR unless the Contractor is responsible for the service. If the Contractor is responsible for the service, submit four (4) certified copies of the written report of each inspection, test or similar service through the Contractor to the RPR.

1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
2. Report Data: Written reports of each inspection, test or similar service shall include, but not be limited to:

a. Date of issue.
b. Project title and number.
c. Name, address and telephone number of testing agency.
d. Dates and locations of samples, tests, and inspections.
e. Names of individuals making the inspection or test.
f. Designation of the Work and test method.
g. Identification of product and Specification Section.
h. Complete inspection or test data.
i. Test results and interpretations of test results.
j. Ambient conditions at the time of sample-taking and testing.

k. Comments or professional opinion as to whether inspected or tested Work complies with Contract Document requirements.
l. Name and signature of laboratory inspector.
m. Recommendations on re-testing.

1. 6 QUALITY ASSURANCE

A. Qualification for Service Agencies: Engage inspection and testing service agencies, including independent testing laboratories, which are pre-qualified as complying with "Recommended Requirements for Independent Laboratory Qualification" by the American Council of Independent Laboratories, and which specialize in the types of inspections and tests to be performed.

1. Each independent inspection and testing agency engaged on the Project shall be authorized by Authorities Having Jurisdiction to operate in the State of Florida.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

A. General: Upon completion of inspection, testing, sample-taking and similar services, repair damaged construction and restore substrates and finishes to eliminate deficiencies, including deficiencies in visual qualities of exposed finishes. Comply with Contract Document requirements for "Cutting and Patching."

1. Remove all deficient Work and replace it with Work of specified quality, or take such other corrective action as the RPR and A/E may direct. No increase will be made in the Contract Sum or in Contract Time as a result of authorizing a change in methods or equipment under this Article.

B. Protect construction exposed for quality control services.

END OF SECTION 01 45 00

SECTION 01 45 16 - FIELD TEST FOR WATER LEAKAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Field test to determine resistance to water leakage in wall systems in accordance with performance requirements indicated including joints in adjacent construction which are designed to remain permanently closed and watertight.

B. Contractor will pay costs of testing laboratory for this test.

1.2 DEFINITIONS

A. Water Leakage: Any uncontrolled water that appears on any normally exposed interior surfaces, that is not contained or drained back to exterior, or that can cause damage to adjacent materials or finishes. Water contained within drained flashings, gutters, and sills is not considered water leakage.

1.3 SUBMITTALS

A. (SD-12) Field Quality Control Reports: Written report of testing and inspection required by “Field Quality Control”.

B. (SD-13) Qualification Data: For testing agency.

1. For firms and persons specified in "Quality Assurance" to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and OARs, and other information specified.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

B. Field Water Spray Testing: Selective field testing will be conducted in accordance with AAMA Standard 501.2: “Quality Assurance and Diagnostic Water Leakage Field Check of Installed Storefronts, Curtainwalls, and Sloped Glazing Systems”.

1. Water Spray Test without Air Pressure Difference: Designated areas shall be tested according to AAMA 501.2 and shall not evidence water penetration.
2. Test shall be performed prior to installation of interior finishes.

C. Field Chamber Testing: Selective field testing will be conducted in accordance with ASTM E 1105 “Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors by Uniform or Cyclic Static Air Pressure Difference” and ASTM E 783 “Standard Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors”.

D. Water Penetration Test with Static Air Pressure Difference: Designated areas shall

be tested according to ASTM E 1105 at a minimum static air pressure differential specified for laboratory testing in "Performance Requirements" and shall not evidence water penetration.

E. Test chamber shall include adjacent joints and interior/exterior construction.
F. Section of wall shall include a entire bay section of curtain wall and masonry /stucco finished wall.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Refer to Technical Sections for performance requirements of each system or product to be tested.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Acceptance of Surfaces and Conditions: Examine substrates to receive products and systems and associated work for compliance with requirements and other conditions affecting performance. Proceed only when unsatisfactory conditions have been corrected in a manner complying with Contract Documents. Starting work within a particular area will be construed as acceptance of surface conditions.

3.2 INSTALLATION, GENERAL

A. Installation Quality Standards: In addition to standards listed elsewhere, perform Work according to following, unless otherwise specified:

1. Respective manufacturer’s written installation instructions.
2. Accepted submittals.
3. Contract Documents.

3.3 PREPARATION

A. General: Comply with manufacturer’s instructions, recommendations, and specifications for cleaning and surface preparation. Surfaces shall have no defects, contaminants, or errors which would result in poor or potentially defective installation or would cause latent defects in Work.

B. Exterior wall construction shall be completed, and shall be fully glazed to provide complete wall installation. Work shall be done in strict accord with approved shop drawings and job specifications.

3.4 FIELD QUALITY CONTROL TESTING

A. Testing Services, General: Testing and inspecting of representative areas of exterior walls shall take place as installation proceeds to determine compliance of installed assemblies with specified performance requirements.

B. Testing Agency Field Service: Engage a qualified independent testing agency

employed by Contractor and approved by Architect to perform field quality control. Materials and installation failing to meet specified requirements shall be replaced at Contractor's expense. Retesting of materials and installations failing to meet specified requirements shall be done at Contractor's expense

C. Architect shall designate test procedure and areas of completed walls to be checked.

1. Field Testing shall be performed at intervals and locations including but not limited to the following:
   a. Field Water Spray Testing per AAMA 501.2: Perform tests at intervals and locations in each test area as directed by Architect; however, not less than 1-percent of total units or 5 units minimum, whichever is greater, shall be tested for each type of glazing system and configuration.
   b. Field Chamber Testing per ASTM E 1105: Perform tests at intervals and locations in each test area as directed by Architect; however, not less than 3 static water test minimum, shall be tested for each type of glazing system and configuration.
2. Systems shall be tested in accordance with definitions and at performance requirements indicated in Technical Sections.
3. Test wall at 15-percent, 50-percent, and 75-percent completion unless directed otherwise.

D. All joints or other conditions within designated areas where leakage may occur will be tested.

E. Indoor side of wall in this area shall be unfinished and left open and unobstructed, permitting full length of joints to be examined from indoor side.

F. If operable joints such as those around doors and operable parts of windows occur within wall area involved, appropriate modifications both of procedure and performance requirements will be made in respect to such joints.

3.5 TEST REPORTS

A. Testing laboratory shall be responsible for conducting and reporting tests, shall state in report whether or not test specimen conforms to requirements of Contract Documents approved drawings, and shall specifically note any deviations.

B. Testing laboratory shall submit its report directly to Contractor and Architect. Necessary corrections shall be performed in presence of Architect. Tests shall be witnessed by Architect/Consultant. Approval of test assembly and test results rests with the Architect.

C. Test Reports: Shall be prepared according to testing standard indicated.

3.6 REMEDIAL WORK BY CONTRACTOR

A. In event of failure to initially meet test requirements called for hereinabove, Contractor and respective subcontractors shall, as required, redesign, rework, and/or re-fabricate, reship and re-erect assemblies until said requirements are met,

at no additional cost to RPR.

B. Wherever leakage has occurred, joints shall be made watertight in manner acceptable to Architect.

C. Remedial work involving use of curing-type compounds shall be allowed to set for one week before it is re-checked for leakage.

D. After necessary remedial work has been completed, and required curing time, if any, has elapsed, repaired joints shall be retested.

E. Should leakage still be found, further remedial measures shall be taken and checking shall be repeated until joints in designated area are found to be satisfactory.

F. Re-checking, when required, shall be performed by testing laboratory originally employed by Contractor.

END OF SECTION 01 45 16

SECTION 01 45 29 - STRUCTURAL TESTING AND INSPECTIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for quality assurance and quality control to be completed by the Testing Laboratory, Contractor, and/or the Geotechnical Engineer for the following structural items:

1. Concrete Reinforcing.
2. Cast-in-Place Concrete.
3. Masonry.
4. Structural Steel.
5. Steel Joists or Steel Joists and Joist Girders.
6. Steel Decking.
8. Cold-Formed Metal Framing.
10. Rough Carpentry – blocking, nailers, etc.
11. Earthwork.

B. Related Requirements:

1. Specification 01 45 00 "Quality Control" for other independent testing agency procedures and administrative requirements.
2. Refer to the drawings for the Threshold Inspection Plan for requirements for additional inspections to be completed by the Threshold Inspector.

1.2 PRICE AND PAYMENT PROCEDURES

A. Unit Prices:

1. Cost Proposal: The Testing Laboratory's proposal shall contain unit price stipulations for specified tests and inspections and on an hourly basis for personnel. A total price shall also be submitted with bid.

B. Measurement and Payment

1. Payment of the Testing Laboratory: The contractor will pay for the Laboratory services for inspection and testing of materials for compliance with the requirements of the Contract Documents.
2. Payment for Substitution Testing: The Contractor shall arrange for and pay for any additional samples and tests above those required by the Contract Documents as requested by the Contractor for his convenience in performing the work.
3. Payment for Retesting: When initial tests indicate work does not comply with the requirements of the Contract Documents, the Contractor shall be liable for the cost for any additional inspections, sampling, testing, and retesting done by the Testing Laboratory.
4. Payment by Contractor: The Contractor shall furnish and pay for the following items if required:

   a. Soil survey of the location of borrow soil materials, samples of existing

soil materials, and delivery to the Contractor's Testing Laboratory.

b. Samples of concrete aggregates and delivery to the Contractor's Testing Laboratory.
c. Concrete mix designs as prepared by his concrete supplier.
d. Site-situated storage boxes for concrete cylinders
e. Concrete coring, tests of below strength concrete, and load tests, if ordered by the RPR, Architect, or Engineer.
f. Certification of reinforcing steel and prestressing steel mill order.
g. Certification of structural steel mill order.
h. Certification of portland cement, lime, fly ash.
i. Certification of welders and preparation of Welding Procedure Specifications.
j. Tests, samples, and mock-ups of substitute material where the substitution is requested by the Contractor and the tests are necessary in the opinion of the RPR, Architect or Engineer to establish equality with specified items.
k. The making and testing of concrete cylinders for the purpose of evaluating strength at time of form stripping or for post-tensioning or the time spent evaluating the in situ strength of concrete using the Maturity Method.
l. Any other tests when such costs are required by the Contract Documents to be paid by the Contractor.
m. Concrete Testing and sampling.

5. Payment for Tests of Suspected Deficient Work: If, in the opinion of the Building Official, RPR, Architect, or Engineer, any of the work of the Contractor is not satisfactory, the Contractor shall furnish and pay for all tests that the RPR, Architect, or Engineer deem advisable to determine its proper construction. The RPR shall pay all costs if the tests prove the questioned work to be satisfactory.

1.3 ADDITIONAL CONTRACTOR TESTING RESPONSIBILITIES

A. Threshold Inspection: The Contractor shall engage a separate agency to serve as a Threshold Inspector to provide Threshold Inspection services for the items outlined in the Threshold Inspection Plan. The scope of these services is not included in this section and is to be provided separately as outlined in the Threshold Inspection Plan. These inspections are mandatory for conformance to the legal requirements of the Florida Building Code and shall be in addition to the inspections and tests otherwise defined in this specification.

B. The General Contractor shall engage a Geotechnical Engineer to provide inspection services for the foundations as outlined below in Paragraph 3.12.E.

C. The General Contractor shall provide a copy of the project plans and specifications to the Testing Laboratory prior to the start of construction and prior to any pre-installation meetings.

1.4 CONTRACTOR RESPONSIBILITIES

A. Furnishing Samples and Certificates: The Contractor shall provide to the laboratory certificates and representative samples of materials proposed for use in the work in quantities sufficient for accurate testing as specified.

B. Furnishing Casual Labor, Equipment and Facilities: The Contractor shall furnish casual labor, equipment, and facilities as required for sampling and testing by the laboratory and otherwise facilitate the required inspections and tests.

1.5 TESTING LABORATORY RESPONSIBILITIES

A. The Testing Laboratory shall sample and test materials as they are being installed for compliance with specified acceptance criteria. The Testing Laboratory will report and interpret the test results. The Laboratory shall monitor and report on the installation of construction work and shall perform tests on the completed construction as required to indicate Contractor's compliance with the various material specifications governing this work.

B. The Testing Laboratory shall provide inspections on the following items:

1. Welding of reinforcing steel.
2. Inspection of structural steel, bolting, and welding material.
3. Welding of structural steel.
4. High-strength bolting.
5. Compacted earth fill.
6. Concrete Sampling and Lab testing of concrete cylinders.

C. Inspections Required by Government Agencies: The Testing Laboratory shall perform inspections and submit reports and certifications as required by government agencies having jurisdiction over the aspects of the project covered by this specification.

D. Notification of Deficiencies in the Work: The Testing Laboratory shall notify the Architect, Engineer, and Contractor within 24 hours of discovery of observed irregularities and deficiencies of the Work and other conditions not in compliance with the requirements of the Contract Documents. Notification shall be by telephone or e-mail and then in writing. The Testing Laboratory shall provide reports for all testing and visual inspection of work.

E. Accounting: The Testing Laboratory shall submit all billing costs to the Contractor.

F. Monitoring Product and Material Certifications: The Testing Laboratory shall be responsible for monitoring the submittals of product and material certifications from manufacturers and suppliers as specified in the Specifications and shall report to the RPR, Architect, and Engineer when those submittals are not made in a timely manner.

G. Limitations of Authority: The Testing Laboratory is not authorized to revoke, alter, relax, enlarge upon, or release any requirements of the Specifications or to approve or accept

any portion of the work or to perform any duties of the Contractor and his Subcontractors.

1.6 ADMINISTRATIVE REQUIREMENTS

A. Coordination:

1. The Testing Laboratory shall cooperate with the Architect, Engineer, and Contractor and provide qualified personnel promptly on notice.
2. The Contractor shall cooperate with Testing Laboratory personnel and provide access to the work and to manufacturers' operations.
3. Notification of Source Change: The Contractor shall be responsible for notifying the RPR,
4. Architect, Engineer, and Testing Laboratory when the source of any material is changed after the original tests or inspections have been made.

B. Pre-installation Meetings RPR, Architect, Engineer, Contractor, and material suppliers as required to coordinate materials inspection and testing requirements with the planned construction schedule and shall participate in such meetings throughout the course of the project.

C. Scheduling:

1. Advance Notice: The Contractor shall be responsible for notifying the Testing Laboratory sufficiently in advance of operations to allow for assignment of personnel and scheduling of tests. Failure to sufficiently notify may result in additional costs incurred by the Testing Laboratory to the Contractor.

1.7 SUBMITTALS

A. Quality Control Reports:

1. Information on Reports: The Testing Laboratory shall submit copies of reports of inspections and tests promptly. The reports shall contain at least the following information:
   a. Project name.
   b. Date report issued.
   c. Testing Laboratory name and address.
   d. Name and signature of inspector/technician.
   e. Date of inspection and/or sampling.
   f. Date of test.
   g. Identification of product and Specification section.
   h. Location in the project.
   i. Identification of inspection or test.
   j. Record of weather conditions and temperature (if applicable).
   k. Results of test regarding compliance with Contract Documents.
2. Copies: The Laboratory shall send signed electronic (PDF) copies of test and inspection reports to the following parties:
   a. RPR or his/her representative.
   b. Contractor.

c. Architect.
d. Engineer of Record.
e. Threshold Inspector.

3. Discrepancy Log: The Testing Laboratory shall create and maintain a log of all discrepancies throughout the duration of the project.
4. Information on Log: This log shall include, but is not limited to:
   a. Discrepancy date.
   b. Description of discrepancy.
   c. Drawing and/or detail reference.
   d. Description of as-built condition.
   e. Description of any remedial work performed.
   f. Status of discrepancy.
5. Submission Schedule: This log shall be submitted to the Architect/Engineer on a periodic basis for review and comment. Upon completion of the Project, this log shall be submitted in its entirety as an attachment to the final signed report described below under Certifications.

B. Certification: Upon completion of the job, the Laboratory shall furnish to the RPR, Architect, and Engineer of Record, a statement signed by a licensed professional engineer that, to the best of their knowledge, required tests and inspections were made in accordance with the requirements of the Contract Documents.

1.8 QUALITY ASSURANCE

A. Qualifications of Testing Laboratory:

1. The Testing Laboratory shall meet the basic requirements of ASTM E 329 and shall submit to the OAR, Architect, and Engineer evidence of current accreditation from the American Association for Laboratory Accreditation, the AASHTO Accreditation Program or the "NIST" National Voluntary Laboratory Accreditation Program.
2. The Testing Laboratory shall be an Approved Agency by the Building Official to perform Special Inspections and other tests and inspections as outlined in the applicable building code.
3. Tests and inspections shall be conducted in accordance with specified requirements, and if not specified, in accordance with the applicable standards of the American Society for Testing and Materials or other recognized and accepted authorities in the field.
4. Qualifications of Welding Inspectors
   a. Inspectors performing visual weld inspection shall meet the requirements of AWS D1.1 Section 6.1.4. Inspectors shall have current certification as an AWS Certified Welding Inspector (CWI). Assistant inspectors, if any, shall be supervised by an Inspector and shall be qualified by training and experience to perform the specific functions to which they are assigned.
   b. Inspectors performing nondestructive examinations of welds other than visual inspection (MT, PT, UT, and RT) shall meet the requirements of AWS D1.1, Section 6.14.6.

B. The Contractor shall not engage the same testing laboratory for construction services quality assurance testing, unless agreed to by the RPR.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 SCOPE OF WORK

A. The work to be performed by the Testing Laboratory shall be as specified in this Section of the Specification and as determined in meetings with the RPR, Architect, and Engineer.

3.2 CONCRETE REINFORCING

A. Quality Assurance:

1. Review the Welding Procedure Specification (WPS) submitted by the contractor for any reinforcing steel other than ASTM A 706 that is proposed to be welded for consistency with acceptable welding practices and AWS.
2. Review welder qualifications by certification or verify by retesting. Obtain welder certificates.

B. Field Testing: The following tests shall be completed by the Testing Laboratory:

1. Mechanical Tension Splices: The Laboratory shall conduct monotonic tension tests in accordance with ASTM A 1034 of mechanical tension splices of the type as specified on the structural drawings. It is not necessary that the specimens to be tested are production splices, however, the specimens to be tested shall have been made by the Contractor's personnel under field conditions. The rate of testing shall be as follows:
   a. Two specimens for the first 50 splices (or fraction thereof) at the beginning of the job. Splices not meeting tension requirements shall be retested at Contractor's expense until all splices meet the tension requirements.
   b. One specimen for every 100 (or fraction thereof) additional splices occurring on the job. Any splices not meeting tension requirements shall be retested at Contractors expense until all splices have passed the test.
   c. A minimum of one test specimen shall also be selected from transition splices (splices of one bar size to another bar size), if any.

3.3 CAST-IN-PLACE CONCRETE

A. Quality Assurance:

1. Concrete Mix Designs: The Testing Laboratory shall review the submitted mix designs for conformance to the specifications and for suitability for use in the project.
2. Preinstallation Meetings: The Testing Laboratory shall attend the

preinstallation meetings as noted in Specification 03 3000 "Cast-in-Place Concrete."

B. Field Testing: The following tests shall be completed by the Testing Laboratory:

1. During Concrete Placement:
   a. Record the amount of water added and note if it exceeds the amount allowed to be added shown in the approved mix design.
   b. Mold concrete test cylinders as specified below in Paragraph 3.a.
   c. Perform tests to determine slump, concrete temperature, unit weight, and air entrainment as specified below.
   d. Record information for concrete test reports as specified below.
   e. Pick up and transport to Laboratory cylinders cast the previous day.
   f. After Concrete Placement:
   g. In-situ Concrete Strength Verification for Form Stripping: The Testing Laboratory shall perform the tests necessary to determine the concrete strength prior to form stripping:
      1) If concrete strength for form stripping is to be determined using field-cured cylinders, the cylinder shall be broken at the time of form removal as directed by the Contractor.
      2) If concrete strength for form stripping is to be determined using the Maturity Method, the Testing Laboratory shall verify that the requirements of ASTM C 1074 are being followed and that the proper criteria for determining concrete strength by this method has been established and is being followed.
   h. Investigation of Low Strength Concrete Test Results:
      1) Cost of Investigations for Low Strength Concrete: The Contractor shall be responsible for the costs of investigations of low strength concrete, as defined in Part I above.
      2) Scope of Investigations: See Specification Section 03 30 00 "Cast- In-Place Concrete" for the investigations that may be required by the Engineer. The Testing Laboratory will conduct these investigations if required.
   i. Post-Installed Anchors in Concrete:
      1) Verify maximum anchor tightening torque for all applicable post-installed anchors.
      2) Provide pull tests on individual anchors as specified in the ICC Evaluation Services Report, on the drawings, or as directed by the Engineer-of-Record.
   j. Floor Flatness and Levelness Measuring: Perform tests as defined below.
   k. Testing of Concrete Floor Slabs for Acceptability to Receive an Adhesive-Applied, Low-Permeable Floor Covering: Perform tests as defined below.
   l. Testing of Non-Shrink Grout for Base Plates, Bearing Plates, and Precast Wall Panels:
      1) Compressive Strength Tests: Compressive strength of grout shall be determined by testing grout cubes according to the requirements of

ASTM C 109 - Modified. Test one set of three cubes at one day, and one set of three cubes at 28 days. Testing Laboratory shall discuss with the contractor the addition of a third set of grout cubes if the contractor anticipates the higher strength grouts might not achieve the 28-day strength. These shall be paid by the contractor.

2) Frequency of Testing: One set of cubes (6 cubes) shall be made for every ten base plates and bearing plates or fraction thereof but not less than one set for each day's operation. One set of cubes shall be made for each day's operation of grouting wall panels.

2. Standards for Concrete Tests:

a. Concrete Test Cylinders: Mold and test concrete cylinders as described below:

1) Cylinder Molding and Testing: Cylinders for strength tests shall be molded and Laboratory cured in accordance with ASTM C 31 and tested in accordance with ASTM C 39. Cylinders may be either 6” in diameter by 12” or 4” in diameter by 8”, however, the diameter of the cylinder shall be at least three times the nominal maximum size of the coarse aggregate in the mix tested. All of the cylinders for each class of concrete shall be of the same dimension for all sets of that class.

2) Field Samples: Field samples for strength tests shall be taken in accordance with ASTM C 172 at the point of placement.

3) Quantity of Cylinders: Each set of test cylinders shall consist of a minimum of four standard test cylinders. If concrete strength for form stripping is to be determined using field-cured cylinders, one additional cylinder per set will be required for formed slab for the purpose of evaluating the concrete strength at the time of form stripping. This cylinder shall be stored on the floor where form removal is to occur under the same exposure conditions as the floor concrete. The cylinder shall be cured under field conditions in accordance with ASTM C 31. Field-cured test cylinders shall be molded at the same time and from the same samples as laboratory-cured test specimens. The Contractor shall pay for the cost of making and testing these cylinders.

4) Frequency of Testing: A set of test cylinders shall be made according to the following minimum frequency guidelines:

a) One set for each class of concrete taken not less than once a day.

b) Piles: One set for each 50 cubic yards or fraction thereof.

c) Spread Footings: One set for each 50 cubic yards or fraction thereof.

d) Pile Caps: One set for each 50 cubic yards or fraction thereof.

e) Floors: One set for each 150 cubic yards or fraction thereof but not less than one set for each 5,000 square foot of floor area.

f) Columns: One set for each 50 cubic yards or fraction thereof

with a minimum of two sets per floor.

g) Shear Walls: One set for each 50 cubic yards but not less than two sets per floor.

h) Tilt-Up Panels: One set for every 50 cubic yards or fraction thereof.

i) All Other Concrete: A minimum of one set for each 150 cubic yards or fraction thereof but not less than one set for each 5,000 square foot of area for walls.

j) No more than one set of cylinders at a time shall be made from any single truck.

k) If the total volume of concrete is such that the frequency of testing as specified above would provide less than five strength tests for a given class of concrete, tests shall be made from at least five randomly selected batches or from each batch if fewer than five batches are used.

l) The above frequencies assume that one batch plant will be used for each pour. If more than one batch plant is used, the frequencies cited above shall apply for each plant used.

- The cylinders shall be numbered, dated, and the point of concrete placement in the building recorded.
- For concrete specified on the drawings to reach the required strength at 28 days, break one cylinder of the set at seven days, two 6" by 12" cylinders or three 4" by 8" cylinders at 28 days, and keep one in reserve for testing at the Engineer's direction.
- For concrete specified on the drawings to reach the required strength at 56 days, break one cylinder of the set at seven days, one cylinder at 28 days, two 6" by 12" cylinders or three 4" by 8" cylinders at 56 days, and one kept in reserve for testing at the Engineer's direction.
- Cylinder Storage Box: The Contractor shall be responsible for providing a protected concrete cylinder wooden storage box at a point on the job site mutually agreeable with the Testing Laboratory for the purpose of storing concrete cylinders until they are transported to the Laboratory. The box shall be constructed and equipped to maintain the environment specified for initial curing in ASTM C 31.
- Transporting Cylinders: The Testing Laboratory shall be responsible for transporting the cylinders to the Laboratory in a protected environment such that no damage or ill effect will occur to the concrete cylinders including loss of moisture, freezing temperatures or jarring.
- Information on Concrete Test Reports: The Testing Laboratory shall make and distribute concrete test reports after each job cylinder is broken. Such reports shall contain the following information:

m) Truck number and ticket number.

n) Concrete Batch Plant.
o) Mix design number.
p) Accurate location of pour in the structure.
q) Strength requirement.
r) Date cylinders made and broken.
s) Technician making cylinders.
t) Concrete temperature at placing.
u) Air temperature at point of placement in the structure.
v) Amount of water added to the truck at the batch plant and at the site and whether or not it exceeds the amount allowed by the mix design.
w) Slump.
x) Unit weight.
y) Air content.
z) Cylinder compressive strengths with type of failure if concrete does not meet Specification requirements. Seven day breaks are to be flagged if they are less than 60% of the required 28 day strength. 28 day breaks are to be brought to the attention of the Architect and Engineer in writing if either cylinder fails to meet specification requirements.

b. Slump Tests: Slump Tests (ASTM C 143) shall be completed at the beginning of concrete placement for each batch plant and for each set of test cylinders made. The slump test shall be made from concrete taken from the end of the concrete truck chute. The concrete shall be considered acceptable if the slump is within the slump tolerance noted on the mix design submittal form for that class of concrete.
c. Air Entrainment: Air entrainment tests (ASTM C 231 or C 173, C 173 only for lightweight concrete) shall be made at the same time slump tests are made as cited above. Samples for air entrainment tests shall be taken at the point of placement.
d. Concrete Temperature: Concrete temperature at placement shall be measured (ASTM C 1064) at the same time slump tests are made as cited above.
e. Unit Weight Test: ASTM C 138.
f. Floor Flatness and Levelness Measuring:
   1) The Testing Laboratory shall measure the floor for flatness and levelness according to ASTM E 1155.
   2) Measurement of the finished concrete surface profile for any test section shall be made when requested by the Representative at his option. Notwithstanding, measurements shall be made within 24 hours after completion of finishing operations. For structural elevated floors measurement shall also be made prior to removal of forms and shores. The Contractor shall be notified immediately after the measurements of any section are complete and a written report of the floor measurement results shall be submitted within 72 hours after finishing operations are complete.

3) The concrete surface profile shall be measured using equipment manufactured for the purpose such as a Dipstick Floor Profiler as manufactured by the Edward W. Face Company in Norfolk, Virginia, F-Meters manufactured by Allen Face & Company in Norfolk, Virginia, optical, or laser means or other method specified in ASTM E 1155.
4) Each floor test section and the overall floor area shall conform to the two-tiered measurement standard as specified herein.
   a) Minimum Local Value (MLV). The minimum local FF/FL values represent the absolute minimum surface profile that will be acceptable in any one floor test section.
   b) Specified Overall Value (SOV). The specified overall FF/FL values represent the minimum values acceptable for all combined floor test sections representing the overall floor.
5) For purposes of this specification a floor test section is defined as the smaller of the following areas:
   a) The area bounded by column and/or wall lines.
   b) The area bounded by construction and/or control joint lines.
   c) Any combination of column lines and/or control joint lines.
   d) Test sample measurement lines within each test section shall be multidirectional along two orthogonal lines as defined by ASTM E 1155.
   e) The precise layout of each test section shall be determined by the Testing Laboratory and shall be submitted for Architect/Engineer review and approval.

g. Testing of Concrete Floor Slabs for Acceptability to Receive an Adhesive-Applied, Low-Permeable Floor Covering:
1) The following tests shall be performed by the Testing Laboratory as a part of quality assurance testing to insure that the proper moisture condition and alkalinity of the substrate has been achieved prior to installing adhesive-applied, low-permeability floor coverings such as vinyl composition tile (VCT), linoleum, sheet vinyl, vinyl-backed carpet, rubber, athletic flooring, synthetic turf, wood, acrylic terrazzo, thin-set tile, epoxy overlays and adhesives, waterproofing, et.al.
2) Moisture Vapor Emission Rate: Perform testing according to ASTM F 1869 to determine if the moisture emission rate from the floor is below the flooring manufacturer's maximum recommended value but not greater than five pounds per 1,000 square feet per 24 hours.
3) Relative Humidity Determination Test: As an alternate to the Moisture Vapor Emission Rate Test, and if agreed to by the Contractor, Architect and OAR, perform testing according to ASTM F 2170 to determine if the relative humidity of the concrete slab is below the flooring manufacturer's maximum recommended value but not greater than 75%.
4) Alkalinity Testing: Perform testing in accordance with ASTM F 710, Paragraph 5.3, to determine if the pH level of the concrete slab

surface is below the flooring manufacturer's maximum recommended value but not greater than 10. Perform one test per 1,000 square feet with a minimum of three tests within the total area being tested.

3. Evaluation and Acceptance of Concrete:
   a. Strength Test: A strength test shall be defined as the average strength of two six-inch cylinder breaks or three four-inch cylinder breaks from each set of cylinders tested at the time indicated above.
   b. Quality Control Charts and Logs: The Testing Laboratory shall keep the following quality control logs and charts for each class of concrete containing more than 2,000 cubic yards. The records shall be kept for each batch plant and submitted on a weekly basis with cylinder test reports:
      1) Number of strength tests made to date.
      2) Strength test results containing the average of all strength tests to date, the high test result, the low test result, the standard deviation, and the coefficient of variation.
      3) Number of tests under specified strength.
      4) A histogram plotting the number of strength test cylinders versus compressive strength.
      5) Quality control chart plotting compressive strength test results for each test.
      6) Quality control chart plotting moving average for strength where each point plotted is the average strength of three previous test results.
      7) Quality control chart plotting moving average for range where each point plotted is the average of 10 previous ranges.
   c. Acceptance Criteria: The strength level of an individual class of concrete shall be considered satisfactory if both of the following requirements are met:
      1) The average of all sets of three consecutive strength tests equal or exceed the required f'c.
      2) No individual strength test falls below the required f'c by more than the greater of 10% of f'c or 500 PSI.
   d. If either of the above Acceptance Criteria requirements is not met, the Testing Laboratory shall immediately notify the Engineer by telephone. Steps shall immediately be taken to increase the average of subsequent strength tests.

C. Causes for Rejection of Concrete: The Contractor shall reject concrete delivered to the site for any of the following reasons:

1. Wrong class of concrete (incorrect mix design number).
2. Environmental Conditions: Environmental condition limits shall be as follows unless appropriate provisions in concreting practices have been made for cold or hot weather:
   a. Cold Weather: Air temperature must be 40°F and rising or the average daily temperature cannot have been lower than 40°F for 3 consecutive days unless the temperature rose above 50°F for at least one-half of any of those 24 hour periods.

b. Hot Weather: Environmental conditions must be such that cause an evaporation rate from the concrete surface of 0.2 lb./sq. ft./hr. or less as determined by Figure 2.1.5 in ACI 305R-91.
c. Concrete may be placed at other environmental condition ranges only with approval of the job inspector for the Testing Laboratory or other duly appointed representative.

3. Concrete with temperatures exceeding 95°F shall not be placed in the structure.
4. Air contents outside the limits specified in the mix designs.
5. Slumps outside the limits specified.
6. Excessive Age: Concrete shall be discharged within 90 minutes of plant departure or before it begins to set if sooner than 90 minutes unless approved by the Laboratory job inspector or other duly appointed representative.

D. Concrete Batch Trip Tickets: Concrete batch trip tickets shall be collected and retained by the Contractor. Compressive strength, slump, air, and temperature tests shall be identified by reference to a particular trip ticket. Tickets shall contain the information specified in ASTM C 94. Each ticket shall also show the amount of water that may be added in the field for the entire batch that will not exceed the specified

water cement ratio for the design mix. The Contractor and Testing Laboratory shall immediately notify the Architect/Engineer and each other of tickets not meeting the criteria specified.

3.4 PRECAST STRUCTURAL CONCRETE

A. Scope of Work: The Testing Laboratory shall furnish the necessary technicians and equipment to perform the following tests and inspections. Schedule the time for visits to the precast plant in consultation with the Supplier, Architect, Engineer, and RPR. Submit a proposed unit price for each visit and base the total proposed price on providing three visits. Inspections shall be performed by a qualified technician with a minimum of two years of experience in precast concrete testing and inspection.

B. Quality Assurance:

1. Verify that the fabricator's fabrication and quality control procedures provide a sound basis for inspection control of workmanship and of the ability to conform to construction documents and industry standards. Review the procedures for completeness and adequacy relative to code requirements for the fabricator's finished product.

C. Source Inspection:

1. Preliminary plant inspection prior to the start of fabrication including the following:
   a. Inspection of the batching facilities including aggregate stock piles, material handling facilities, concrete batching and mixing facilities, and in plant concrete handling, placing, and consolidating procedures and equipment.
   b. Inspection of the in-plant testing and curing facilities.

c. Inspection of the casting beds shall be made to check for cleanliness, alignment, and surface condition of the bed.
d. Inspection of the stressing blocks and stressing procedures including verification of the calibration of the stressing jacks to be used in the work.
e. A review of the concrete mix designs proposed for use in the work.

2. Inspection prior to placing concrete including the following:
   a. Inspect formwork for finish condition, dimensions, and dimensional tolerances.
   b. Verify reinforcing steel placement and concrete cover.
   c. Inspect 100% of hardware and embedded items for proper size, location, and finish.
   d. For prestressed members, observe and inspect the stressing operation recording the following information:
      1) Initial and final gauge load reading during tendon stressing.
      2) Tendon elongation measurement.
      3) Obvious irregularities or stress loss during anchoring procedures.
3. Inspection during concrete placement including the following:
   a. Verify that environmental conditions and concrete temperatures are within the limits stipulated.
   b. Verify that the proper class of concrete is being used for the members being poured.
   c. Inspect plastic concrete to verify proper batching and mix consistency.
   d. Verify the molding, curing and testing of concrete cylinders by the Precast Producer are in accordance with the specifications and project requirements.
4. Inspection after concrete placement including the following:
   a. For prestressed members:
      1) Verify minimum concrete strength at time of stress transfer.
      2) Witness transfer of stress to concrete and report procedures used including release sequence of multi-tendon transfer.
   b. After form stripping:
      1) Check dimensions of precast units.
      2) Verify required cambers.
      3) Visually inspect the precast units for proper finish, cracks, and other surface defects and imperfections.

D. Field Testing: Refer to Article 3.4 for testing requirements of cast-in-place concrete elements associated with precast structural concrete, such as topping slabs.

E. Reporting:
   1. The Testing Laboratory shall write an inspection report promptly after each plant and site visit for distribution to the parties specified.
   2. Any irregularities in the work shall be immediately reported by telephone to the Engineer and Architect.

3.5 MASONRY

A. Quality Assurance:

1. Concrete Masonry Unit: For each type of concrete masonry unit indicated, verify compliance with ASTM C 90 and the strength required by design. Verification may be by reviewing certification from unit producer showing compliance.
2. Review field welder qualifications by certification or verify by retesting. Obtain welder certificates.

B. Field Testing:

1. Masonry Strength Testing:
   a. Verification Testing Frequency: Verification of masonry strength (f'm) will be performed at the beginning of masonry construction.
   b. Mortar:
      1) Throughout construction, verify the proportions of the site- prepared mortar mix comply with the requirements of ASTM C 270 for the type specified.
      2) Verify the proportions of materials in premixed or preblended mortar comply with the requirements of ASTM C 270 for the type specified as delivered to the site.
      3) Mortar Tests: Verify mortar composition with specified requirements according to ASTM C 780, Annex A4; made at following times during Work:
         a) First day
         b) 5 percent
         c) 15 percent
         d) 30 percent
         e) 60 percent
   c. Grout:
      1) Prior to grouting, verify the proportions of site-prepared grout mix comply with the requirements of ASTM C 476 for each type of grout used.
      2) Verify the proportions of materials in premixed or pre-blended grout comply with the requirements of ASTM C 476 as delivered to the site.
      3) For grout pre-mixed at a batch plant or otherwise not prepared on site, grout shall be sampled and tested in accordance with ASTM C 1019. Prepare one set of grout samples for testing at seven days and two sets for testing at 28 days.
      4) Test each mix provided, according to ASTM C 1019 for compressive strength. Perform one set of tests for each 5000 sf of wall area or portion thereof unless otherwise indicated.
   d. Report test results in writing and in form specified under each test method, to Architect and Contractor, on same day tests are made.
   e. Retests: Where prism tests indicate non-compliance with specified requirements, additional testing shall be performed at the frequency of two additional tests for each unsatisfactory test. The cost of such additional testing shall be the responsibility of the Contractor. Where retesting fails to

indicate conformance with specified requirements, any masonry construction represented by unsatisfactory tests shall be removed and replaced with acceptable masonry construction.

2. Testing of Non-Shrink Grout for Base Plates and Bearing Plates:
   a. Compressive Strength Tests: Compressive strength of grout shall be determined by testing grout cubes according to the requirements of ASTM C 109 - Modified. Test one set of three cubes at one day, and one set of three cubes at 28 days.
   b. Frequency of Testing: One set of cubes (6 cubes) shall be made for every ten base plates and bearing plates or fraction thereof but not less than one set for each day's operation. One set of cubes shall be made for each day's operation of grouting wall panels.

C. Field Inspection:

1. Anchors:
   a. Verify maximum anchor tightening torque for all post-installed anchors.
   b. Provide pull tests on individual anchors as specified on the drawings or as directed by the Engineer-of-Record.
   c. Welding of Reinforcing Bars: Observe the welding of reinforcing bars.

3.6 STRUCTURAL STEEL

A. Scope of Work:

1. Contract Obligations:
   a. Contractor Responsibility: The contractor shall pay for shop and field inspections and tests as required during the fabrication and erection of the structural steel.
   b. Testing Laboratory Responsibility: The inspection by the Testing Laboratory of the Fabricator's work shall be in sequence, timely, and performed in such a manner so that corrections can be made without delaying the progress of the work. Inspections shall be performed by qualified technicians with a minimum of two years of experience in structural steel testing and inspection. Refer to Paragraph 1.9.4.b for special requirements for welding inspectors. The Testing Laboratory shall provide test reports of inspections. All test reports shall indicate types and locations of defects found during inspection, the measures required and performed to correct such defects, statements of final approval of welding and bolting of shop and field connections, and other fabrication and erection data pertinent to the safe and proper welding and bolting of shop and field connections. Weld inspection reports shall be signed by an inspector with current certification as an AWS Certified Welding Inspector (CWI). In addition to the parties listed in this Specification the Fabricator and Erector shall receive copies of the test reports.
   c. Rejection of Material or Workmanship: The OAR, Architect, Engineer, and Testing Laboratory reserve the right to reject any material or workmanship not in conformance with the Contract Documents at any time during the progress of the work. However, this provision does not

allow waiving the obligation for timely, in sequence inspections.

B. Quality Assurance:

1. Verify the fabrication shop's certification from AISC.
2. Verify that the fabricator's fabrication and quality control procedures provide a sound basis for inspection control of workmanship and of the ability to conform to construction documents and industry standards. Review the procedures for completeness and adequacy relative to code requirements for the fabricator's finished product.
3. Review field welder qualifications by certification or verify by retesting. Obtain welder certificates.

C. Source Testing: The Testing Laboratory shall provide the following tests at the designated fabrication shops:

1. Test welds completed in the shop according to Paragraph G "Weld Testing" below.
2. Test bolted connections completed in the shop according to Paragraph I "High-Strength Bolt Testing."

D. Source Inspection: The Testing Laboratory shall provide the following inspections at the designated fabrication shops:

1. An initial shop inspection prior to the start of any fabricating work shall be made to accomplish the following:
   a. Perform tasks outlined in Paragraphs G.1, G.2 and G.3 of welding inspection duties described below in Paragraph G "Weld Inspection and Process Monitoring" when shop welding is to be performed.
   b. Perform tasks outlined in paragraph J.1 of bolt inspection duties described below in Paragraph I "High-Strength Bolt Inspection and Process Monitoring" when shop bolting involves joints that are designated on the plans as Pretensioned or Slip-Critical.
2. Process Monitoring:
   a. Provide continuous or periodic monitoring of welding as described below in Paragraph G "Weld Inspection and Process Monitoring."
   b. Provide continuous or periodic monitoring of bolting as described below in Paragraph J "High-Strength Bolt Inspection and Process Monitoring" of high-strength bolt installation in pre-tensioned or slip-critical joints using turn-of-the-nut without matchmarking or calibrated wrench method of bolt installation.
   c. Provide periodic verification of specified camber of steel beams.

E. Field Testing: The Testing Laboratory shall provide the following tests in the field:

1. Test welds completed in the field according to Paragraph H "Weld Testing:" below.
2. Test bolted connections completed in the field according to Paragraph I "High-Strength Bolt Testing."
3. Perform bend tests on completed shear connectors attached to beams as required according to procedures outlined in AWS D1.1. In addition, perform

field bend tests on an additional 2% of completed shear connectors on each beam but not less than one connector per beam.

4. Testing of Non-Shrink Grout for Base Plates, Bearing Plates, and Precast Wall Panels:
   a. Compressive Strength Tests: Compressive strength of grout shall be determined by testing grout cubes according to the requirements of ASTM C 109 - Modified. Test one set of three cubes at one day, and one set of three cubes at 28 days.
   b. Frequency of Testing: One set of cubes (6 cubes) shall be made for every ten base plates and bearing plates or fraction thereof but not less than one set for each day's operation. One set of cubes shall be made for each day's operation of grouting wall panels.

F. Field Inspection: The Testing Laboratory shall provide the following inspections in the field:

1. Inspect galvanized HSS and other cold-worked structural steel members for cracking or other damage resulting from galvanizing process. Endeavor to complete inspections prior to erection of these members. Immediately notify Contractor and Architect/Engineer of any irregularities discovered.
2. Provide continuous or periodic monitoring of field welding as described below in Paragraph G "Weld Inspection and Process Monitoring."
3. Provide continuous or periodic monitoring of field bolting as described below in Paragraph I "High-Strength Bolt Inspection and Process Monitoring" of high-strength bolt installation in pre-tensioned or slip-critical joints using turn-of-the- nut without matchmarking or calibrated wrench method of bolt installation.
4. Inspect welded or bolted connections that were completed, but not inspected, in the shop. Perform inspections according to Paragraph G "Weld Inspection and Process Monitoring" and/or Paragraph I "High-Strength Bolt Inspection and Process Monitoring" as appropriate.
5. Obtain the planned erection procedure, and review with the Erector's supervisory personnel.
6. Check the installation of base plates for proper leveling, grout type, and grout application.
7. Check structural steel as received in the field for possible shipping damage, workmanship, and identification marking to conform to AISC 360 for structural steel and specified ASTM standards for other steel.
8. Verify that surveys are occurring as specified to check plumbness and frame alignment as erection progresses. Review the submitted survey report.
9. Periodically inspect the steel frame for such items as bracing and stiffening details, member locations, and joint details at each connection for compliance with approved construction documents.
10. Inspect 100% of the column compression and base joints for verification that gaps in contact bearing do not exceed 1/16 inch. Gaps greater than 1/16 inch but less than 1/4 inch shall be reported to the OAR and Engineer for assessment. All gaps greater than 1/4 inch shall be shimmed according to Specification 05 12 00 "Structural Steel Framing."
11. Endeavor to guard the RPR against the Contractor cutting, grinding, reaming, or

making any other field modification to structural steel without the prior approval of the Engineer. Report any noted unauthorized modifications to the RPR and Engineer.

G. Weld Inspection and Process Monitoring: The Testing Laboratory shall make the following inspections of the welds and welding processes. Welds performed in the fabricating shop may be inspected in the field unless continuous monitoring of the welding process is herein specified or if access in the field due to other work or shop finishes makes field inspection impractical:

1. Approve Welding Procedure Specifications submitted by the Contractor. Approve any changes submitted by the Contractor to any WPS that has already been approved. Obtain the Welding Procedure Qualification Record (WPQR) for each successful WPS qualification.
2. Periodically verify welding electrodes to be used and other welding consumables as the job progresses.
3. Periodically observe joint preparation, assembly practice, welding techniques including preheating and sequence, and the performance of welders with sufficient frequency to assure compliance with code and contract document requirements. Check preheating to assure conformance with AWS D1.1, Section 5.6. Verify procedure for control of distortion and shrinkage stresses.
4. Continuously observe joint preparation and fit up, backing strips, and runout plates for welded moment connections and column splices.
5. Periodically provide visual inspection of the root pass of partial and complete joint penetration welds.
6. Visually inspect 100 % of welds for proper size, length, location, and weld quality in accordance with AWS D1.1 requirements. Unless specifically noted otherwise, all welding shall be considered statically loaded nontubular connections.
7. Visually inspect 100% of completed shear connectors on each beam.
8. Visually inspect 100% of the welds of anchors to embedded plates that are to be cast into concrete elements.
9. In addition to the inspections above, perform the following:
   a. Continuously monitor and observe joint preparation, assembly practice, welding techniques including preheating and sequence, and the performance of welders for 100% of complete and partial joint penetration welds, plug and slot welds, multiple-pass fillet welds, and single-pass fillet welds greater than 5/16 inch.
   b. Check preheating to assure conformance with AWS D1.1, Section 5.6. Verify procedure for control of distortion and shrinkage stresses.
   c. Periodically monitor welding of single-pass fillet welds that are less than or equal to 5/16 inch.
   d. Periodically monitor the welding of headed studs to floor beams.
   e. Periodically monitor the welding of anchors to embedded plates that are to be cast into concrete elements.

H. Weld Testing:

1. Perform nondestructive examination services using a qualified technician with the

necessary equipment to perform the following:

a. Nondestructive examination conducted in accordance with the specific requirements for the item being examined including radiographic (RT), ultrasonic (UT), magnetic particle (MT), or dye-penetrant inspection (PT). Nondestructive inspection procedures shall conform to AWS D1.1.
b. Interpret, record, and report results of the nondestructive tests.
c. Mark for repair, any area not meeting Specification requirements. Correction of rejected welds shall be made in accordance with AWS D1.1.
d. Re-examine repair areas and interpret, record, and report the results of examinations of repair welds.
e. Verify that quality of welds meet the requirements of AWS D1.1.

2. Fillet Welds: Provide the following:
   a. MT test a minimum of 10% of the length of each fillet weld exceeding 5/16".
   b. Periodic MT testing of representative fillet welds 5/16" and less but need not exceed 10% of all such welds, except as required for high rejection rates as indicated in the following paragraph.
   c. Increase MT testing rate for welders having a high rejection rate as required to ensure acceptable welds.
3. Partial Joint Penetration (PJP) Welds, including Flare-Bevel Groove Welds: Provide the following:
   a. MT test a minimum of 25% of the length of each PJP weld exceeding 5/16" effective throat.
   b. Periodic MT testing of representative PJP welds 5/16” and less but need not exceed 10% of all such welds, except as required for high rejection rates as indicated in the following paragraph.
   c. Increase MT testing rate for welders having a high rejection rate as required to ensure acceptable welds.
4. Complete Joint Penetration (CJP) Welds: Provide the following:
   a. All CJP welds exceeding 5/16" thickness shall be 100% UT tested per AWS D1.1 Clause 6 Part F. The Testing Laboratory shall review the CJP joints to determine where geometry or accessibility precludes the use of standard scanning patterns per AWS D1.1 Clause 6 Part F. At these locations the testing laboratory shall develop and submit for approval a written testing procedure in accordance with AWS D1.1 Annex S.
   b. Periodic MT testing of representative CJP welds 5/16” and less not to exceed 10% of all such welds, except as required for high rejection rates as indicated in the following paragraph.
   c. Increase MT testing rate for welders having a high rejection rate as required to ensure acceptable welds.
5. Acceptance Criteria:
   a. Visual, MT, PT shall be per AWS D1.1 Table 6.1.
   b. UT testing shall be per AWS D1.1 6.13.1 and Table 6.2.
6. Base metal thicker than 1.5 inches, where subjected to through-thickness weld shrinkage strains, shall be UT tested for discontinuities behind and adjacent to

such welds. UT testing shall occur no sooner than 24 hours after the weld has cooled to ambient temperatures. Any material discontinuities shall be recorded on the basis of ASTM A 435 or ASTM A 898 (Level 1 criteria) and reported for Engineer disposition.

7. Welds of Anchors to Embedded Plates:
   a. Headed Studs: Perform field bend tests according to AWS D1.1 on 2% of the studs welded to plates, but not less than one stud per plate.
   b. Deformed Bar Anchors: Perform MT testing on 10% of deformed bar anchors larger than #5 bar.
8. The costs of repairing defective welds and the costs of retesting by the Testing Laboratory shall be borne by the Contractor. If removal of a backing strip is required by the Testing Laboratory to investigate a suspected weld defect, such cost shall be borne by the Contractor.
   a. High-Strength Bolt Inspection and Process Monitoring: The Testing Laboratory shall perform the following inspections for connections joined with high-strength bolts. Bolting performed in the shop may be inspected in the field unless continuous monitoring of the bolting operation is specified herein:
9. Observe pre-installation verification testing of the pretensioning method to be used in accordance with the requirements of the “Specification for Structural Joints Using High-Strength Bolts”.
10. Check daily the calibration of impact wrenches used in field bolted connections.
11. Inspect bolt installation for 100% of high strength bolted connections according to inspection procedures outlined in the "Specification for Structural Joints Using High-Strength Bolts".
12. Monitoring of Bolting Installation:
    a. Continuous Monitoring: The Testing Laboratory shall be continuously present and monitor the bolting installation for compliance with the selected procedure for installation as specified in the “Specification for Structural Joints Using High-Strength Bolts” for joints using high- strength bolts that are designated on the plans as Pretensioned (PT) or Slip-Critical (SC) type joints and that are being installed using the calibrated wrench method or the turn-of-nut without match-marking method of installation.
    b. Periodic Monitoring: All joint types and bolt installation methods shall be monitored on a periodic basis.
    c. High-Strength Bolt Testing: The Testing Laboratory shall perform the following tests for connections joined with high-strength bolts:
13. Perform Arbitration Testing according to procedures outlined in the "Specification for Structural Joints using High-Strength Bolts" when a disagreement exists between the Testing Laboratory and the Fabricator as to the minimum tension of installed bolts that have been inspected according to paragraph below.

3.7 STEEL JOISTS

A. Scope of Work: The Testing Laboratory shall perform inspection of steel joists as

described herein.

B. Quality Assurance:

1. Verify that the fabricator maintains detailed quality control procedures that provide a basis for inspection control of workmanship and of the ability to conform to approved construction documents and industry standards. Verify that these procedures are complete and adequate relative to code requirements for fabricator's scope of work.
2. Verify welding procedures, welder qualifications and weld material prior to the start of work.
3. Review field welder qualifications by certification or verify by retesting. Obtain welder certificates.

C. Source Inspection:

1. Provide periodic inspection of the welding work in progress. Visually inspect 100% of welds prior to shipment of shop welded assemblies.
   a. Verify camber requirements.

D. Field Testing:

1. Perform Magnetic Particle testing (MT) on representative field welds not to exceed 10% of such welds unless rejection rates become high, in which case, frequency of inspection shall be increased to ensure acceptable welding.

E. Field Inspection: The duties of the Testing Laboratory shall be as follows:

1. Inspect joists for damage during shipment.
2. Visually inspect 100% of welded chord splices for compliance with SJI and project specifications.
3. Confirm bolting of joists to supports at column lines as required by OSHA requirements.

3.8 STEEL DECKING

A. Field Inspection:

1. Check steel deck as received in the field for possible shipping damage, workmanship, and identification marking to conform to specified ASTM standards for steel deck.
2. Periodically monitor the method of attaching the steel floor and roof decking to the structural frame.
3. Visually inspect 100% of the welding or other attachment method of steel deck to the structure and at side laps.

3.9 COLD-FORMED METAL FRAMING

A. Field Inspection:

1. Periodically inspect welding of main wind-force-resisting systems.
2. Periodically inspect screwing, bolting, anchoring and other fastening techniques used to attach components of the main wind-force-resisting

systems, including shear walls, braces, diaphragms, collectors, and hold downs.

3.10 EARTHWORK

A. Quality Assurance:

1. Welder Qualifications: Verify welder qualifications either by certification and/or by retesting. Obtain welder certificates.

B. Source Inspection:

1. Precast Concrete Piles:
   a. Plant Inspection: Inspect forms, placement of reinforcing steel, and strands, placement and finishing of concrete, and tensioning of strands.

C. Field Testing:

1. Compacted Fill:
   a. Verification of Fill Material: Perform classification and testing to verify that the fill material to be used complies with the project specifications.
   b. Field Density Testing: Perform field density testing as described below:
      1) Field density tests shall be run according to ASTM D 2937 or ASTM D 6938 as applicable.
      2) Acceptance Criteria: The results of field density tests by the Laboratory will be considered satisfactory if the average of any three consecutive tests has a value not less than the required density with no single test falling more than 2 percent below the required density and the moisture content conforms to the requirements of the specification.
      3) Test Frequency for Paved Areas and Building Slab Subgrade:
         a) Make at least one field density test of the natural subgrade for every 2500 square feet of paved area or building slab but in no case less than three tests.
         b) In each compacted fill layer or lift, make one field density test for every 2500 square feet of building slab or paved area but in no case less than three tests.
      4) Test Frequency for Foundation Wall Backfill: Make at least one field density test for each 200 lineal feet of wall with a minimum of 4 tests for the basement walls around the perimeter of each building and a minimum of one test for every other type of foundation wall on the site. Tests shall be performed in random lifts along each wall.
      5) Test Frequency for Compacted Fill beneath Column and Wall Footings and Mat Foundations: Make at least one field density test in each compacted fill layer or lift for each column footing, one for each twenty-five lineal feet of wall and one for each 2,500 square feet of mat foundation area or fraction thereof.
   c. Report Copies: Moisture-density curves and results of field density tests shall be submitted to the parties specified earlier in this section.
   d. Additional Testing: If reports by the Laboratory indicate field densities lower

than specified, additional tests will be run by the Laboratory with at least the frequencies scheduled above on recompacted fill and/or natural subgrade. The Testing Laboratory shall notify the Contractor on a timely basis for any required retesting so as not to delay the work. The costs of such tests shall be borne by the Contractor.

2. Spread (Excavated) Footings
   a. Concrete Cylinders: Make and test concrete cylinders as specified for Cast-in-Place Concrete.

D. Field Inspection by the Testing Laboratory:
   1. The Testing Laboratory shall provide inspection of materials used in foundation elements as described below.
   2. Compacted Fill:
      a. Subgrade below Compacted Fill: Observe and verify that the subgrade below compacted fill has been properly prepared before compact fill construction begins.
      b. During placement and compaction of fill, determine that the material being used and the maximum lift thickness comply with the specifications.

E. Foundation Inspection by the Geotechnical Engineer: The Geotechnical Engineer of Record shall provide inspection service for the following items before and during foundation installation as appropriate for the foundation type. The Geotechnical Engineer shall submit written field inspection reports promptly after inspection to the parties listed above and report his findings after each inspection by telephone or e-mail to the Engineer.
   1. Spread (Excavated) Footing:
      a. Subgrade: Verify that foundation bearing conditions are consistent with soil report tests and that the footing is being installed in the proper soil strata at the proper elevation. Make recommendations regarding adjustment to subgrade or bearing elevation if subgrade is not adequate to support footing.

END OF SECTION 01 45 29

SECTION 01 50 00 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Conditions/Provisions of the Contract, including Contractual Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, maintenance of traffic, security and protection.

B. Temporary utilities which may be required include but are not limited to:

1. Temporary electric power and light.
2. Telephone service.
3. Temporary project identification sign - all other signs are prohibited.
4. Drinking water.
5. Sanitary facilities.

C. Temporary construction and support facilities which may be required include but are not limited to:

1. Storage sheds.
2. Dewatering facilities and drains.
3. Temporary enclosures including demising walls.
4. Waste disposal services.
5. Construction aids and miscellaneous services and facilities.
6. Storm and sanitary sewer.
7. Fuel tanks larger than 15 gallons.
8. Temporary Wayfinding Signage.

D. Temporary construction and support facilities, Contractor's option:

1. Field office.

a. Temporary field offices WILL be allowed on the construction site.
b. If a field office is used it shall be located within the secure fence enclosure of the site of project.

E. Security and protection facilities which may be required include but are not limited to:

1. Temporary fire protection.

2. Barricades, warning signs, lights.
3. Sidewalk bridge or enclosure fence for the site.
4. Environmental protection.

1.3 SUBMITTALS

A. Temporary Utilities: Maintain reports of tests, inspections, meter readings and similar procedures performed on temporary utilities for review by the OAR.

B. Implementation and Termination Schedule: Show implementation and termination of temporary utilities in the baseline schedule required by Section 01 32 15 Scheduling of Work.

C. Maintenance of Traffic Plan: Submit a "Maintenance of Traffic Plan" within fourteen (14) days of the date established for commencement of work requiring the maintenance of traffic.

1.4 QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations of Authorities Having Jurisdiction, including but not limited to:

1. Building Code requirements.
2. Health and safety regulations.
3. Utility company regulations.
4. Environmental protection regulations.

B. Standards: Comply with NFPA Code 241, "Building Construction and Demolition Operations,” ANSI-A10 Series standards for "Safety Requirements for Construction and Demolition,” and NECA Electrical Design Library "Temporary Electrical Facilities."

1. Refer to "Guidelines for Bid Conditions for Temporary Job Utilities and Services", prepared jointly by AGC and ASC, for industry recommendations.
2. Electrical Service: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).

C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

A. Temporary Utilities: Include in the project schedule dates for implementation and termination of each temporary utility. Coordinate with the OAR change over from use of temporary service to use of the permanent service.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, or permit them to interfere with progress. Do not allow hazardous dangerous or unsanitary conditions, or public nuisances to develop or persist on the site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Where visible to the public, provide new materials suitable for the use intended. Where not visible to the public, Contractor may provide undamaged previously used materials, suitable for the use intended.

B. Lumber and Plywood: Comply with requirements in Division-6 Section "Rough Carpentry."

C. Tarpaulins: Provide waterproof, fire-resistant, UL labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosures provide translucent nylon reinforced laminated polyethylene or polyvinyl chloride fire retardant tarpaulins.

D. Water: Provide potable water meeting the requirement of the local health authorities.

2.2 EQUIPMENT

A. General: Provide new equipment or previously used equipment in serviceable condition suitable for use intended.

B. Electrical Outlets: Provide properly configured NEMA polarized outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button and pilot light, for connection of power tools and equipment.

C. Electrical Power Cords: Provide grounded extension cords; use "hard-service" cords where exposed to abrasion and traffic. Provide waterproof connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress. Eliminate trip hazards.

D. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.

E. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM or another recognized trade association related to the type of fuel being consumed.

F. Temporary Toilet Units: Provide self-contained single-occupant toilet units of the chemical type, properly vented and fully enclosed with a glass fiber reinforced polyester 2`shell.

G. First Aid Supplies: Comply with governing regulations.

1. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable, UL-rated, class "ABC" dry chemical extinguishers, or a combination of extinguishers of NFPA recommended classes for the exposures.
2. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Use qualified personnel for installation of temporary facilities. Comply with all applicable codes. Relocate and modify facilities as required.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.

1. Arrange with the utility company for a time when service can be interrupted, where necessary, to make connections for temporary services.
2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.
3. Cost or use charges for temporary facilities are not chargeable to the Owner, RPR or the Designer, and will not be accepted as a basis of claims for a Change Order.

A. Water Service: Install water service and distribution piping of sizes and pressures adequate for construction.

1. Provide a backflow prevention device.

A. Temporary Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period.

B. Temporary Lighting: Whenever overhead floor or roof deck has been installed, provide temporary lighting with local switching.

1. Install and operate temporary lighting that will fulfill security and protection requirements, without operating the entire system, and will provide adequate illumination for construction operations and traffic conditions.

C. Temporary Telephones: Provide temporary telephone service for personnel engaged in construction activities, throughout the construction period.

D. Temporary Communication to the internt via Telephone service provider to temporaty office.

3.3 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

A. General: Locate field offices, storage sheds, sanitary facilities and other temporary construction and support facilities as indicated.

1. Maintain temporary construction and support facilities until near Final Acceptance. Remove prior to Final Acceptance. Personnel remaining after removal will be permitted to use permanent facilities, under conditions acceptable to the OAR.
2. Provide non-combustible construction for offices, shops and sheds located within the construction area, or within 30 feet of building lines. Comply with requirements of NFPA 241.
3. Obtain permits with AHJ for temporaty facilities.

A. Temporary Heat: Provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

B. Heating Facilities: Except where use of the permanent system is authorized, provide vented self-contained LP gas with individual space thermostatic control.

C. Use of gasoline-burning space heaters, open flame, or salamander type heating units is prohibited.

D. Storage and Fabrication Sheds: Install storage and fabrication sheds, sized, furnished and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds may be open shelters or fully enclosed spaces within the building or elsewhere on the site.

E. Sanitary Facilities: Sanitary facilities include temporary toilets, wash facilities and drinking water fixtures. Comply with local health authorities for the administration of these facilities.

1. Provide toilet tissue, paper towels, paper cups and similar disposable materials for each facility. Provide covered waste containers for used material.
2. Temporary Toilets shall be self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted.
3. Wash Facilities: Install wash facilities supplied with potable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.

4. Drinking Water Accommodations: Provide drinking water accommodations as necessary, including paper supply.

F. Dewatering Facilities and Drains: For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with dewatering requirements of applicable Division 2 Sections. Where feasible, utilize the same facilities. Maintain the site, excavations and construction free of water.

G. Temporary Lifts and Hoists: Provide facilities for hoisting materials, if required.

H. Project Identification/Construction Company Identification Sign: Prepare project identification sign of the size indicated; install sign where indicated to inform the public and persons seeking entrance to the Project. Securely attach, as required. Install sign at commencement of construction and remove upon issuance of the Certificate of Occupancy/Certificate of Completion (CofO).

1. Size: Two and one-half feet by five feet with four inch radius corners.
2. Quality Assurance: Engage an experienced sign painter to apply graphics.
3. Location: Locate on demising wall.
4. Graphic Description: Information shall include the Owner, Contractor, and Designer name, project name, and completion date.

   a. Type Style: Frutiger 55 or Helvetica Medium.
   b. Color: Jetport Brown background with white lettering.
   c. Quantity: One sign per project.

I. Pardon our dust sign may be provided via the Owner's sign shop.

J. Collection and Disposal of Waste: Collect waste from construction areas daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than seven (7) days during normal weather or three (3) days when the temperature is expected to rise above 80 degrees F (27 degrees C). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of material in a lawful manner.

1. The Contractor shall not use the Owner's waste disposal systems.
2. The Owner will not provide waste disposal services.

K. Fuel tanks larger than 15 gallons

1. All Equipment

   a. The Contractor will follow the guidance provided with regard to all equipment used on the work site. All equipment with Aboveground Storage Tanks (AST's) fuel tanks that have a capacity of 15 gallons or more but less than 550 gallons will

adhere to the following guidelines. Equipment with tanks that have a capacity of 550 and more gallons will adhere to Florida Administrative Code 62-761.

b. Each piece of equipment with a tank capacity of 15 gallons or more will be required to have secondary containment. The capacity of the secondary containment will be 110% of the tank. As a minimum, five sheets of 10-mil visqueen will be used to line the secondary containment. The visqueen will overlap the outside walls of the secondary containment a minimum of 24 inches. The Owner recommends a single sheet of puncture resistant neoprene of ¼ inch thick as a liner in the secondary containment or concrete containment.

c. The secondary containment will be checked on a periodic basis and the fluid buildup will be disposed accordingly. Visible sheen will indicate contaminated water and will be disposed on in accordance with Florida Administrative Code (FAC) 62-777.

d. Mobile storage tanks that meet the criteria of FAC 62-677 are exempt from these procedures.

L. Temporary Wayfinding Signage

1. Provide temporary signs as required to maintain proper airport operations during all aspects of the Work.
2. Provide temporary signage that duplicates any removed or hidden permanent signs as a result of the Work.
3. Coordinate all temporary signs with the RPR and airport. Develop a temporary sign plan for review by the RPR and airport. At a minimum, the plan shall show where all temporary signs are to be located, the messages that are to appear, when the signs will be installed, how the signs will be installed, when the signs will be installed, when the signs will be removed, the sign face layouts, the sign colors, and the materials to be used.
4. Temporary signs shall be safely and securely installed. Repair any damage to any walls, building surfaces, or building finishes resulting from the installation or the removal of the temporary signs. Once they have been taken down, remove from the site and properly dispose of the temporary signs.
5. Coordinate the installation and removal of the temporary signs with the RPR and Airport. Also coordinate the installation and removal of the temporary signs with the Project phases and construction progress.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. General: Except for use of permanent fire protection as soon as available, do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer as requested by the RPR and Airport.

B. Temporary Fire Protection: Install and maintain temporary fire protection facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers," and NFPA 241 "Standard for Safeguarding Construction, Alterations and Demolition Operations."

1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
2. Store combustible materials in containers in fire-safe locations.
3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, exitways and other access routes for fighting fires.
4. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.

C. Barricades, Warning Signs and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed provide lighting, including flashing red or amber lights.

D. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which produce harmful noise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.5 OPERATION, TERMINATION AND REMOVAL

A. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by the elements.

B. Termination and Removal: Unless the RPR requests that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than Final Acceptance. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged Work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of the Contractor.
2. Prior to Final Acceptance, clean and renovate permanent facilities that have been used during the construction period, including but not limited to:

    a. Repair of any and all damages to existing materials or finishes. Repair shall be complete and made to the satisfaction of the RPR at no additional cost.
    b. Replace air filters and clean inside of ductwork and housings.
    c. Replace existing significantly work parts and parts that have been subject to unusual operating conditions due to the Work.
    d. Replace lamps that are burned out or noticeably dimmed by substantial hours of use.

END OF SECTION 01 50 00

SECTION SECTION 01 60 00 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Conditions/Provisions of the Contract, including Contractual Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes administrative and procedural requirements governing the Contractor's selection of products for use in the Project.

1.3 DEFINITIONS

A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents, such as "specialties," "systems," "structure," "finishes," "accessories," and similar terms. Such terms are self-explanatory and have well-recognized meanings in the construction industry.

1. "Products" are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

a. "Named Products" are items identified by the manufacturer's product name, including make or model number or other designation, shown or listed in the manufacturer's published product literature, that is current as of the date of the Contract Documents.

b. "Foreign Products," as distinguished from "domestic products," are items substantially manufactured (50 percent or more of value) outside the United States and its possessions. Products produced or supplied by entities substantially owned (more than 50 percent) by persons who are not citizens of, nor living within, the United States and its possessions are also considered to be foreign products.

2. "Materials" are products substantially shaped, cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.

3. "Equipment" is a product with operational parts, whether motorized or manually operated, that requires service connections, such as wiring or piping.

1.4 SUBMITTALS

A. Product List: Prepare a list of specified products. Include the manufacturer's name and proprietary product names for each item listed.

1. Coordinate product list with the Contractor's Construction Schedule and the Schedule of Submittals.
2. Form: Prepare product list with information on each item tabulated under the following column headings:

    a. Related Specification Section number.
    b. Generic name used in Contract Documents.
    c. Proprietary name, model number, and similar designations.
    d. Manufacturer's name and address.
    e. Supplier's name and address.
    f. Installer's name and address.
    g. Projected delivery date or time span of delivery period.

3. Submit list following procedures and requirements as outlined in Division 1 Specifications Section Shop Drawings, Product Data, and Samples.

1.5 QUALITY ASSURANCE

A. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source.

1. When specified products are available only from sources that do not, or cannot, produce a quantity adequate to complete project requirements in a timely manner, consult with the OAR to determine the most important product qualities before proceeding. Qualities may include attributes, such as visual appearance, strength, durability, or compatibility. When a determination has been made, select products from sources producing products that possess these qualities, to the fullest extent possible.

B. Compatibility of Options: When the Contractor is given the option of selecting between 2 or more products for use on the Project, the product selected shall be compatible with products previously selected, even if previously selected products were also options.

1. The Contractor is responsible for providing products and construction methods that are compatible with products and construction methods of the subcontractors.

2. If a dispute arises over concurrently selectable, but incompatible products, the OAR will determine which products shall be retained and which are incompatible and must be replaced.

C. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products that will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on concealed surfaces or, where required for observation after installation, on accessible surfaces that are not conspicuous.

2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface that is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data:

   a. Name of product and manufacturer.
   b. Model and serial number.
   c. Capacity.
   d. Speed.
   e. Ratings.
   f. UL Listing or other Owner approved listing agency.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products according to the manufacturer's recommendations, using means and methods that will prevent damage, deterioration, and loss, including theft.

1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.

2. Coordinate delivery with installation time to assure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3. Deliver products to the site in an undamaged condition in the manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

4. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.

6. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.

7. Store products subject to damage by the elements above ground, under cover in a weathertight enclosure, with ventilation adequate to prevent condensation. Maintain temperature and humidity within range required by manufacturer's instructions.

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, new at the time of installation.

1. Provide products complete with accessories, trim, finish, safety guards, and other devices and details needed for a complete installation and the intended use and effect.

2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situations on other projects.

B. Product Selection Procedures: The Contract Documents and governing regulations govern product selection. Refer to Section 01 60 00 Product Requirements.

1. Visual Matching: Where Specifications require matching an established Sample, the Designer(s) decision will be final on whether a proposed product matches satisfactorily.

a. Where no product available within the specified category matches satisfactorily and complies with other specified requirements, comply with provisions of the Contract Documents concerning "substitutions" for selection of a matching product in another product category.

2. Visual Selection: Where specified product requirements include the phrase "...as selected from manufacturer's standard colors, patterns, textures..." or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Designer will select the color, pattern, and texture from the product line selected.

PART 3 - EXECUTION

3.1 INSTALLATION OF PRODUCTS

A. Comply with manufacturer's instructions and recommendations for installation of products in the applications indicated. Anchor each product securely in place, accurately located and aligned with other Work.

1. Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration.

END OF SECTION 01 60 00

SECTION 01 73 29 - CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Conditions/Provisions of Contract, including Contractual Conditions and other Division 1 Specification Sections, apply to this Section. Refer to other Specification Sections for specific requirements and limitations applicable to cutting and patching individual parts of the work.

1.2 SUMMARY

A. This Section includes cutting into existing construction to provide for installation or performance of the Work, subsequent fitting, and patching required to restore surfaces to original condition.

1. Execute cutting, fitting, and patching, including excavation and backfill, required to perform Work and to:

a. Make parts fit together properly.

b. Remove and replace defective work.

c. Remove and replace Work not conforming to requirements of Contract Documents.

d. Uncover Work to allow for the RPR’s and A/E’s observation of covered Work which has been covered prior to required observation of the RPR and A/E.

2. Drilling of holes for the installation of fasteners and similar operations is not considered to be cutting and patching.

1.3 BUILDING MODIFICATIONS

A. General: Modifications to existing facililties and structures shall be provided as indicated and as necessary to accomplish the Work of these Contract Documents.

1. Modifications shall include the removal of existing structure, relocation of materials indicated, termination and relocation of utilities, cutting, patching, cleaning, adjusting, and refinishing, and all incidental work related and required for the installation of new Work.

2. It is intended to maintain daily occupancy functions during the progress of this Work. The Contractor shall closely coordinate his Work to minimize any inconvenience to the Owner or Owner's operations.

3. No Public Services or utility systems shall be interrupted without first notifying the RPR and obtaining concurrence for the interruption as instructed in the Summery of Work.

1.4 SUBMITTALS

A. Cutting and Patching Proposal: Submit a proposal describing procedures well in advance of the time cutting and patching will be performed and request approval to proceed. Include the following information, as applicable:

1. Describe the extent of cutting and patching required and how it is to be performed.

2. Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building's appearance and other significant visual elements.

3. List products to be used and firms that will perform Work.

4. Indicate dates when cutting and patching is to be performed.

5. List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.

6. Where cutting and patching involves addition of reinforcement to structural elements, submit details and engineering calculations to show how reinforcement is integrated with the original structure.

7. Approval by the RPR to proceed with cutting and patching does not waive the Owner’s right to later require complete removal and replacement of Work found to be cut and patched in an unsatisfactory manner.

B. Hot Work and Dust Hazard - Notify the RPR 48 hours (excluding weekends and holidays) in advance of any welding, cutting, burning, soldering, dust activities or any hot work. Utilize the Owners Hot Work/Dust Hazard Permit Forms.

1.5 QUALITY ASSURANCE

A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load-carrying capacity or load-deflection ratio.

B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety.

1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems:

a. Water, moisture, or vapor barriers.
b. Membranes and flashings.
c. Electrical wiring systems.
d. Control systems.
e. Communications systems.
f. Conveying systems.
g. Shoring, bracing, and sheeting.
h. Primary operational systems.
i. Air or smoke barriers.
j. Fire protection systems.
k. Noise and vibration control elements and systems.
l. Water lines.
m. Sewer lines.
n. Other special construction.

C. Visual Requirements: Do not cut and patch construction in a manner that would degrade the building's aesthetics, or result in visual evidence of cutting and patching. Remove and replace Work cut and patched unsatisfactorily.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, obtain the OAR’s approval to use substitute materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect. Use materials whose installed performance will equal or surpass that of existing materials.

B. Verify that new materials are compatible with existing materials in all respects where cutting and patching occurs.

PART 3 - EXECUTION

3.1 INSPECTION

A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

1. Before proceeding, meet at the site with all parties involved in cutting and patching. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts with RPR before proceeding.

3.2 PREPARATION

A. Temporary Support: Provide temporary support of Work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.

1. Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

C. Cutting: Take all precautions necessary to avoid cutting existing pipe or conduit serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

3.3 PERFORMANCE

A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer's recommendations.

1. In general, where cutting is required, use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.

3. Cut through concrete and masonry using a cutting machine such as a carborundum saw or diamond core drill.

4. Comply with requirements of applicable sections of Division 2 specifications where cutting and patching requires excavating and backfill.

5. By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed, relocated or abandoned. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve or plug and seal the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.

2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

3. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials, if necessary to achieve uniform color and appearance.

   a. Where patching occurs in a smooth painted surface, extend final paint coat over entire unbroken surface containing the patch, after the patched area has received primer and second coat.

4. Patch, repair, or rehang existing ceilings as necessary to provide an even plane surface of uniform appearance.

3.4 CLEANING

A. Thoroughly clean areas where cutting and patching is performed or used as access. Remove completely any paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged pipe covering to its original condition.

END OF SECTION 01 73 29

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SECTION 01 74 23 - FINAL CLEANING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Conditions/Provisions of the Contract, including Contractual Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes: final cleaning at Substantial Completion.

B. Environmental Requirements: Conduct cleaning and waste-disposal operations in compliance with local laws and ordinances. Comply fully with federal and local environmental and antipollution regulations.

1. Do not dispose of volatile wastes, such as mineral spirits, oil, or paint thinner, in storm or sanitary drains.

2. Burning or burying of debris, rubbish, or other waste material on the premises is not permitted.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cleaning Agents: Use cleaning materials and agents recommended by the manufacturer or fabricator of the material to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General: Provide final-cleaning operations. Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit of Work to the condition expected from a commercial building cleaning and maintenance program. Comply with manufacturer's instructions.

B. Cleaning Operations: Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for the entire Project or a portion of the Project.

1. Clean the Project Site, yard and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and foreign substances.

2. Sweep paved areas broom clean. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

3. Broom clean concrete floors in unoccupied spaces.

4. Remove petrochemical spills, stains, and other foreign deposits.

5. Remove tools, construction equipment, machinery, and surplus material from the site.

6. Vacuum clean carpet and similar soft surfaces, removing debris and excess nap. Shampoo, if required.

7. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

8. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, and similar spaces.

9. Remove marks, stains, fingerprints, and other soils or other dirt from painted, decorated, and natural finished woodwork and other Work.

10. Clean cabinet work removing stains, paint, dirt and dust.

11. Remove spots, plaster, soil and paint from ceramic tile, marble, and other finished materials, and wash or wipe clean.

12. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

13. Clean flooring materials thoroughly, comply with materials manufacturer’s instructions and recommendations.

14. Remove labels that are not permanent labels.

15. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.

    a. Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.

16. Clean food-service equipment to a sanitary condition, ready and acceptable for its intended use.

17. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

18. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

19. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs and defective and noisy starters in fluorescent and mercury vapor fixtures.

20. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

21. Clean ductwork, blowers, and coils of units that were operated during construction.

22. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

23. Leave the Project clean and ready for occupancy.

C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid the Project of rodents, insects, and other pests. Comply with regulations of local authorities.

D. Removal of Protection: Remove temporary protection and facilities installed during construction to protect previously completed installations during the remainder of the construction period.

E. Compliances: Comply with governing regulations and safety standards for cleaning operations. Remove waste materials from the site and dispose of lawfully.

1. Where extra materials of value remain after completion of associated Work, they become the Owner's property. Dispose of these materials as directed by the OAR.

2. The Contractor shall not dispose of debris or waste materials on the Owner’s property without the prior approval of the Owner.

F. Maintenance: Provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to assure operability without damaging effects.

3.2 PROTECTIONS

A. General: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where applicable, such exposures include, but are not limited to, the following:

1. Excessive static or dynamic loading.
2. Excessive internal or external pressures.
3. Excessively high or low temperatures.
4. Thermal shock.
5. Excessively high or low humidity.
6. Air contamination or pollution.
7. Water or ice.
8. Solvents.
9. Chemicals.
10. Light.
11. Radiation.
12. Puncture.
13. Abrasion.
14. Heavy traffic.
15. Soiling, staining, and corrosion.
16. Bacteria.
17. Rodent and insect infestation.
18. Combustion.
19. Electrical current.
20. High-speed operation.
21. Improper lubrication.
22. Unusual wear or other misuse.
23. Contact between incompatible materials.
24. Destructive testing.
25. Misalignment.
26. Excessive weathering.
27. Unprotected storage.
28. Improper shipping or handling.
29. Theft.

END OF SECTION 01 74 23

SECTION 01 78 00 - CLOSEOUT SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Conditions/Provisions of Contract, including Contractual Conditions and other Division 1 Specification Sections, apply to this Section. Refer to other specification sections for requirements and limitations applicable to Project Closeout.

1.2 SUMMARY

A. Closeout is defined to include general requirements near end of Contract Time, in preparation for Substantial Completion, Final Completion and Acceptance, Final Payment, normal termination of Contract, occupancy by Owner and similar actions evidencing completion of the Work. Specific requirements for individual units of Work are specified in other sections.

1.3 SUBSTANTIAL COMPLETION

A. General: Refer to the General Conditions/Provisions of the Contract for Construction.

B. Procedures to achieving Substantial Completion:

1. The Contractor shall, five (5) business days prior to requesting inspection for certification of Substantial Completion, prepare and submit to the OAR the following:

   a. The Contractor’s prepared comprehensive punch list of items to be completed or corrected. The punch list shall include all incomplete Work items and the schedule to complete each item.

   b. Draft Operation and Maintenance (O&M) Manuals for review by the RPR for conformance with the Contract documents. These will be returned to the Contractor.

   c. As-Built Documents (from Contractor) for review by the RPR for conformance with the Contract Documents. These will be returned to the Contractor.

2. The Contractor will request a preliminary inspection from the RPR for the determination that the Project is ready for the Substantial Completion Inspection. The Contractor will prior to the request:

   a. Complete its punch list and provide a copy to the RPR.

b. Schedule inspections from the Authorities Having Jurisdiction and provide the time and date to the RPR.

If the RPR's preliminary inspection discloses any item that is not in accordance with the requirements of the Contract Documents, whether or not included on the Contractor's punch list, the RPR shall so notify the Contractor and the Contractor shall add the items to its punch list. The Contractor shall proceed to complete or correct every item on the revised punch list and request re-inspection from the RPR.

3. If the RPR determines that the Work is ready, the Substantial Completion Inspection will be scheduled at a minimum of three (3) business days after the RPR's preliminary inspection.

4. Form #008 Substantial Completion Acceptance (SCA) will be used to: document the time and place of the project closeout inspections, establish the participants to be involved in the inspections, establish the date of Substantial Completion, document the acceptance of the Substantial Completion punch list, document the date all Substantial Completion punch list items were completed and document the date of Final Completion.

5. The following parties will attend the Substantial Completion inspection: the RPR, the Contractor, and the A/E. The following Owner representatives may attend: VPS ARFF, VPS Engineering, VPS Environmental, VPS IT, VPS Maintenance, VPS Operations, VPS Properties, VPS Risk Management, and any involved tenant(s).

6. Following the inspection, the RPR and A/E will determine if the Work is substantially complete. If it is determined to be Substantially Complete, the RPR will use this date in the preparation of Form #007 Certificate of Substantial Completion (CoSC) and the Contractor in the preparation of the written warranties. The following will be used in the determination of the Substantial Completion date:

   a. Certificate of Occupancy/Certificate of Completion (CofO) or Agency Sign Off (as required). The date of the CofO does not establish the date for Substantial Completion.

   b. Recommendation from the RPR and A/E that determine the Project is Substantially Complete.

   c. Acceptance from the Contractor and RPR that the preliminary Substantial Completion punch lists represent most of the items required for completion of the Work. The RPR shall distribute the preliminary Substantial Completion punch lists to the Contractor within a maximum of three (3) business days after the date of Substantial Completion.

   d. Acceptance by the RPR of the draft warranties.

e. Acceptance by the RPR of the draft Operation & Maintenance Manuals.

f. Agreement from the Contractor and RPR that the Owner will have complete use or occupancy and may use, operate, and maintain the Project in all respects, for its intended purpose and without undue interference by the Contractor's Final Completion efforts.

g. If any of the above items are not accepted or incomplete the Contractor shall correct any items found not to be in accordance with the requirements of the Contract Documents and once the items have been corrected, the Contractor shall provide a written request for re-review and or re-inspection.

7. When the Project is determined to be Substantially Complete the RPR will prepare a typed Substantial Completion punch list which includes any items from the preliminary Substantial Completion punch list that have not yet been completed plus all punch list items from the A/E, RPR, Owner and others, and Form #007 Certificate of Substantial Completion (CoSC) within a maximum of fifteen (15) business days from the date of Substantial Completion and will schedule a meeting with the Contractor, A/E, and any Owner's representatives to:

a. Review Form #007 CoSC, all of its requirements and submit to the Contractor for appropriate acceptance and signature.

b. Review the attachments: Form #008 SCA, Substantial Completion punch list and the CofO.

c. Establish the date for the completion of the Substantial Completion punch list items.

d. Establish the responsibilities of the Owner and Contractor for security, maintenance, operations, cleaning and housekeeping, heating and cooling, utilities, damage to the Work and insurance.

e. Review and accept the Contractor's written warranties and guarantees from its Subcontractors and Suppliers bearing the date of Substantial Completion stating the period of warranty as required by the Contract Documents, the Final Operation & Maintenance Manuals, and As-built Documents.

1.4 PARTIAL OCCUPANCY OR USE

A. General: Refer to the General Conditions/Provisions of the Contract for Construction.

B. The Owner may occupy or use any completed or partially completed portion of the Work at any stage and, if the Owner chooses such partial occupancy, the Contractor and

Owner shall designate by an agreement the conditions of such partial occupancy, provided such occupancy or use is consented to by the Owner's insurer and authorized by public authorities having jurisdiction over the Work.

1. Such partial occupancy or use may commence whether or not the portion is Substantially Complete.

C. Procedures to achieving partial occupancy or use:

1. The Owner will request the RPR to coordinate with the Contractor for a partial occupancy or use of a portion of the Work.

2. If the RPR determines that the Work is ready, a partial occupancy or use inspection will be scheduled at a minimum of three (3) business days after the RPR’s preliminary inspection.

3. Immediately prior to such partial occupancy or use inspection, the Owner, RPR, Contractor and A/E shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

   a. The following parties will attend the partial occupancy or use inspection: the RPR the Contractor, and the A/E. The following Owner representatives may attend: VPS Engineering, VPS Environmental, VPS Maintenance, VPS Operations, VPS Properties, VPS Risk Management, VPS ARFF, and any involved tenant(s).

4. Following the inspection, the RPR and A/E will determine if the Work is ready for partial occupancy or use. If it is determined to be ready, the RPR will use this date in the preparation of Form #009 Partial Occupancy/Use (POUA) and the Contractor in preparation of any agreed upon written warranties. The following will be used in the determination of the POUA date:

   a. Certificate(s) of Occupancy (CofO) / Agency Sign Off (as required) for the area being occupied.

   b. Recommendation from the RPR and A/E that determine the Project is ready for partial occupancy or use.

   c. Acceptance from the Contractor and RPR that the preliminary punch lists represent most of the items required for completion of the Work. The RPR shall distribute the preliminary punch lists to the Contractor within a maximum of three (3) business days after the date of the POUA.

   d. Acceptance by the RPR of the draft warranties if requested.

e. Acceptance by the RPR of the draft Operation & Maintenance Manuals if requested.

f. Agreement from the Contractor and RPR that the Owner will have complete occupancy or use and may use, operate, and maintain the Project in all respects, for its intended purpose and without undue interference by the Contractor's Final Completion efforts.

g. Agree that partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work which is not in conformance with the requirements of the Contract Documents.

5. When the Project is determined to be ready for partial occupancy or use the RPR will prepare a typed punch list which includes any items from the preliminary Substantial Completion punch list that have not yet been completed plus all punch list items from the Designer, RPR, Owner and others, and Form #009 Partial Occupancy/Use (POUA) within a maximum of fifteen (15) business days of the date of POUA and will schedule a meeting with the Contractor, Designer, and any Owner's representatives to:

a. Review Form #009 POUA, all of its requirements and submit to the Contractor for appropriate acceptance and signature.

b. Review the attachments: punch list and the CofO.

c. Establish the date for the completion of the punch list items.

d. Establish the responsibilities of the Owner and Contractor for security, maintenance, operations, cleaning and housekeeping, heating and cooling, utilities, damage to the Work and insurance.

e. Review and accept the requested Contractor's written warranties and guarantees from its Subcontractors and Suppliers bearing the date of the POUA stating the period of warranty as required by the Contract Documents.

1.5 FINAL COMPLETION

A. General: Refer to the General Conditions/Provisions of the Contract for Construction.

B. Procedures: Complete the following.

6. Before requesting final inspection for certification of Final Completion and final payment, prepare and submit to the RPR the following:

a. Contractor's certified copy of the Substantial Completion punch list of items to be completed or corrected, stating that each item has been completed or

otherwise resolved for acceptance, and the list has been endorsed and dated by the RPR.

b. Final meter readings for utilities, and similar data as of the date of Substantial Completion, or when the Owner took possession of and responsibility for corresponding elements of the Work.

c. Closeout Documentation Manual.

7. If theRPR determines that the Work is ready, the Final Completion Inspection will be scheduled at a minimum of three (3) business days after the RPR’s preliminary inspection.

8. The following parties will attend the Final Completion inspection: the RPR, the Contractor, and the A/E. The following Owner representatives may attend: VPS ARFF, VPS Engineering, VPS Environmental, VPS IT, VPS Maintenance, VPS Operations, VPS Properties, VPS Risk Management, and any involved tenant(s).

9. Upon acceptance of the Final Completion Inspection, the A/E, RPR and VPS Maintenance are to sign off on Part IV of Form #008 SCA and provide the final inspection date. The RPR is to provide the Contractor’s completed punch list which will be field verified and each item initialed complete by the Designer and the OAR. The RPR is to provide documentation of FAA/FDOT final inspections, as required. Part IV of Form #008 SCA must be completed prior to processing the Contractor’s final pay application.

C. If necessary, re-inspection will be repeated at the Contractor’s expense. Re-inspection Procedure: The RPR and A/E will re-inspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the RPR and A/E. Repeat Final Completion Procedures above until Final Completion is accepted.

1.5 CLOSEOUT DOCUMENTATION MANUAL

A. Description: Submit the manual in a vinyl covered, 3-ring binder; white, with hard cover, with clear vinyl pockets on front (sized to hold 8-1/2" x 11" sheets) and spine (minimum spine size 1", maximum 3"). Binder shall be "View Binder" as manufactured by Avery Consumer Products, AVE 0560 series, or approved substitution. Each section shall be divided by an 8-1/2" x 11" reinforced, clear ring binder index, 5 tabs, as manufactured by Wilson Jones, Stock No. WJ-54125, or approved substitution.

10. Full size, machine lettered labels shall be inserted into the front, back, and spine pockets. Labels shall be on white paper with black print, and shall clearly identify the following:

Okaloosa County
DESTIN-FORT WALTON BEACH AIRPORT
(ITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE “C”)
(Manual Title)
(Date)

11. Contents of the Manual shall include:

    a. First page shall be a Cover Page, identifying:

Okaloosa County
DESTIN-FORT WALTON BEACH AIRPORT
(ITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE “C”)
(Manual Title)
(Date)

    b. Second page shall be a Table of Contents.

    c. The next section shall list the Names, Addresses, Contacts, and Phone Numbers for the following:

        1) RPR(s)

        2) A/E(s)

        3) Contractor

        4) Subcontractors (first-tier)

    d. Change Order Summary (prepared by VPS)

    e. Summary of Disbursements (prepared by VPS)

    f. Receipt/Acceptance Form for As-Built Documents
        1) Progress and As-Built Drawing Certification(s) for each applicable Subcontractor (Exhibit D; prepared by Contractor)

        2) Construction Form # 011 (prepared by RPR) with Transmittal to VPS ENGINEERING (signed by VPS Engineering)

    g. Receipt Form for O&M Manuals (Construction Form # 012; prepared by RPR) with Transmittal to VPS MAINTENANCE (signed by VPS Maintenance)

    h. Parking Permit Office Release Form (Construction Form # 001; prepared by Contractor) (signed by VPS Ground Transportation)

i. Badge & I.D. Office Release Form (Construction Form # 002; prepared by Contractor) (signed by VPS Access Control)

j. Key Shop Release Form (Construction Form # 003; prepared by Contractor) (signed by VPS Lockshop)

k. Environmental Group Letter of Concurrence for Closeout (if applicable; prepared by VPS)

l. Certificate(s) of Substantial Completion (Construction Form # 007; prepared by RPR)

   1) Substantial Completion Acceptance with Final Substantial Completion Punch list initialed and dated by Contractor (Construction Form # 008; prepared by RPR)

   2) Partial Occupancy / Use Agreement(s), or POUA Construction Form # 009; prepared by PR)

   3) FAA / FDOT Final Inspection(s) (if applicable; if project has FAA and/or FDOT funding, provide documentation of the invitation to FAA / FDOT and/or the appropriate sign off)

m. Certificate(s) of Occupancy / Agency Sign Off (furnished by Contractor)

n. Current Certificate of Insurance: (furnished by Contractor)

   1) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect and will not be canceled or allowed to expire until at least 30 days prior written notice has been given to the Owner: and

   2) a written statement that the Contractor knows no substantial reason that the insurance will not be renewable to cover the period required by the Contract Documents

o. Consent of Surety to Final Payment with Power of Attorney (AIA Form # G707; furnished by Contractor) (original)

p. Final Release Form from General Contractor (prepared by Contractor) (original, notarized with corporate seal)

q. Final Release Form(s) from Subcontractors / Suppliers (prepared by Subcontractor)

r. Final Payment Application (2 originals, signed and notarized by Contractor and signed by RPR (DBE Disbursement Page completed with Subcontractor performance rating and total payment)

s. Executed Originals of Warranties/Guarantees.

1.6 AS-BUILT DOCUMENTS

A. General: Do not use as-built documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to as-built documents for the RPR’s reference during normal working hours.

1. Submit all As-Built Documents to the RPR as specified in General Conditions.

2. Include fire alarm and building control system(s) drawings and specifications.

B. As-Built Documents: As-Built Documents include Drawings, Specifications, Addenda, Change Orders, and other Modifications. Maintain a clean, undamaged set of blue or black line white-prints of Contract Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross-reference at the corresponding location on the Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date.

12. Mark As-Built sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.

13. Mark new information that is important to the Owner, but was not shown on Contract Drawings or Shop Drawings.

14. Note related Change Order numbers where applicable.

15. Organize As-Built drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates and other identification on the cover of each set.

16. Mark EVERY PAGE of the Drawings with "As-Built".

C. Accurate as-built documents are very important for the Owner and serve several important functions. The Owner utilizes the as-built documents for operation and maintenance, and future modifications, renovations, and particularly for mechanical, plumbing, and electrical systems, which are mostly hidden from view.

1. The working as-built shall show, but shall not be limited to, the following:

a. All concealed and underground utilities, equipment, foundations, or other permanent conditions shall be surveyed and documented. This includes all discovered conditions. All shall be tied to permanent benchmarks showing horizontal and vertical data including but not limited to: beginning/end points, changes in direction points, inverts, grades of drainage, depths below the surface, all surface or underground components such as valves, manholes, drop inlets, clean outs, meters, corner points, etc. Each of the above shall also include a description of: actual quantity, size, and material. GPS coordinates are to be provided for all.

b. The location and dimensions of any changes within the building structure and architectural components. The dimensions shall be actual field measurements.

c. Correct dimensions and details transferred from shop drawings.

d. Correct grade, elevations, cross section, or alignment of roads, earthwork, structures, or utilities if any changes were made from contract plans.

e. Actual location of anchors, construction, and control joints, etc., in concrete.

f. Changes in location of equipment and architectural features.

g. Where contract drawings or specifications present options, only the option selected for construction shall be shown on the final as-built prints. Cross out such words and phrases as "optimal requirement," "or approved substitution," etc., and list specifically the items of material provided.

h. Unusual or uncharted obstructions that are encountered in the contract work area during construction.

i. Changes in details of design or additional information obtained from working drawings specified to be prepared and/or furnished by the Contractor; including but not limited to fabrication, erection, installation plans and placing details, pipe sizes, insulation material, dimensions of equipment foundations, etc.

j. If borrow material for this project is from sources on the Owner’s property, or if Owner’s property is used as a spoil area, the Contractor shall furnish a contour map of the final borrow pit/spoil area elevations.

k. Layout and schematic drawings of electrical circuits and piping. See the Electrical Specifications for the level of detail required to be accurately documented.

l. Layout and schematic drawings of mechanical and plumbing systems and piping. All shall be tied to permanent benchmarks showing horizontal and vertical data of primary and secondary branches.

m. Systems designed or enhanced by the Contractor, such as HVAC controls, fire alarm, fire sprinkler, and irrigation systems. All shall be tied to permanent benchmarks showing horizontal and vertical data of primary and secondary branches.

n. Changes or modifications that result from the final inspection.

1.7 OPERATION & MAINTENANCE MANUALS

A. General: If all specified information can be submitted in a single binder without being overfilled, submit three (3) copies in a white binder with white labels.

17. If all of the information cannot be submitted in a single binder, submit three (3) per design discipline as follows:

a. Architectural; submit in a white binder with white labels.

b. Mechanical; submit in a white binder with green labels.

c. Fire Protection; submit in a white binder with red labels.

d. Electrical; submit in a black binder with white labels.

e. Civil; submit in a white binder with yellow labels.

18. Submit O&M Manuals to OAR as specified in Paragraph 1.3.B.

B. Description: Submit the manual in a vinyl covered, 3-ring binder; with hard cover, with clear vinyl pockets on front (sized to hold 8-1/2" x 11" sheets) and spine (minimum spine size 1", maximum 3"). Binder shall be "View Binder" as manufactured by Avery Consumer Products, AVE 0560 series, or approved substitution. Provide additional binders if a single 3-inch binder is insufficient to contain all closeout information. Each section shall be divided by an 8-1/2" x 11" reinforced, clear ring binder index, 5 tabs. as manufactured by Wilson Jones, Stock No. WJ-54125, or approved substitution.

19. Full size, machine lettered labels shall be inserted into the front, back, and spine pockets. Labels shall be on paper in color(s) specified with black print, and shall clearly identify the following:

Okaloosa County
DESTIN-FORT WALTON BEACH AIRPORT
(ITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE “C”)
(Manual Title)
(Date)

20. Contents of the Manual shall include:

    a. First page shall be a Cover Page, identifying:

Okaloosa County
DESTIN-FORT WALTON BEACH AIRPORT
(ITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE “C”)
(Manual Title)
(Date)

    b. Second page shall be a Table of Contents indicating the contents of the binder(s).

    c. The third page shall list the Names, Addresses, Contacts, and Phone Numbers for the following:

        1) RPR

        2) A/E(s)

        3) General Contractor

        4) Subcontractors

        5) Sub-subcontractors

        6) Suppliers

    d. The remaining portions of the manual shall be separated by each major division of work as identified by the Contract Documents.

        1) PROJECT INFORMATION (Exhibit A).

        2) Within each major division of work, each section shall be individually identified by a typed index/tab. For each specification requirement, submit the following information in the order outlined below:

            a) Copies of all warranties/guarantees, as specifically required by the specification section, and Letters of Certification. Executed original warranties/guarantees shall be included in the appropriate section of the Closeout Manual(s).

            b) Copies of the "Approved" Shop Drawing/Submittals/ Equipment Manufacturer's Schematics. Oversized drawings shall be folded and inserted in clear vinyl pockets or, for large sets of drawings, provide an insert page stipulating that the drawings are stored at VPS

ENGINEERING. All copies shall be stamped with the appropriate review stamp, marked, signed, and dated.

c) Operation and Maintenance Instructions, including but not limited to:

- Manufacturer's Recommended Care and Cleaning
- Installation Instructions
- Parts Lists
- Lubrication Checklists
- Equipment Supplier Lists
- Special Instructions
- Preventive Maintenance Instructions.

d) Service and Maintenance Contracts: Include Name, address, and phone number and contact of Manufacturer's authorized repair company.

e) Completed Turnover Forms:

- Performance Verification and Demonstration to Owner (Exhibit B) signed by Contractor and VPS representative
- Voltage and amperage Readings (Exhibit C) signed by Contractor, A/E and RPR
- Motor Test Information (Exhibit D) signed by Contractor and RPR.
- Check-out Memo (Exhibit E) signed by Contractor and Manufacturer's representative

f) Equipment and/or Systems Test Data and Conductor Insulation Resistance Test Data Sheets by installer and/or manufacturer where required. Form(s) to be provided by the installer and/or manufacturer performing the test [Exhibits G, H (signed by Contractor, A/E and VPS representative), I (signed by Contractor, Subcontractor and GOAA), J (signed by Contractor and RPR) and K (signed by Contractor, A/E and RPR)].

g) Copies of electrical panel schedules and directories.

C. Submit one copy of the O&M manual in PDF format on USB Jump Drive. Create a PDF file for each section of the manual. PDF files shall be named *C19-2811 OM Sec XXXXXX.pdf*

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.4 CLOSEOUT PROCEDURES

A. Operation and Maintenance Instructions: Arrange for each installer of equipment that requires regular maintenance to meet with the Owner's personnel to provide instruction in proper operation and maintenance. If installers are not experienced in procedures, provide instruction by manufacturer's representatives. Include a detailed review of the following items:

1. Operation and Maintenance manuals.

2. As-Built Documents.

3. Spare parts and materials.

4. Tools.

5. Lubricants.

6. Fuels.

7. Identification systems.

8. Control sequences.

9. Hazards.

10. Cleaning.

11. Warranties and bonds.

12. Maintenance agreements and similar continuing commitments.

B. As part of instruction for operating equipment, demonstrate the following procedures:

13. Start-up.

14. Shutdown.

15. Emergency operations.

16. Noise and vibration adjustments.

17. Safety procedures.

3.4 CLEANING

A. General: General cleaning during construction is required.

B. Final Cleaning: Refer to Section 01 74 23, Final Cleaning.

3.4 ATTACHMENTS

A. The following information sheets have been included in this Section:

1. Exhibit A: Project Information
2. Exhibit B: Performance Verification and Demonstration to Owner
3. Exhibit C: Check-Out Memo
4. Exhibit D: Progress and As-Built Document Certification
5. Exhibit E: Spare Parts Certification Memo
6. Exhibit F: Existing Facilities Investigation Memo
7. Example: Description Sheet – Cover
8. Example: Description Sheet - Spine

EXHIBIT A
PROJECT INFORMATION
DESTIN-FORT WALTON BEACH AIRPORT

Contractor shall fill in the blanks below and insert in the Operation and Maintenance Manuals. Submit one (1) sheet for each major division of Work.

Project Name: ITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE "C"

Specification Division Number & Name: _____

Subcontractor: _____

Contact: _____ Phone: _____

Date Project Bid: _____

Project Start Date: _____

Days allowed for Construction: _____

Target Completion: _____

Substantial Completion Certification Date: _____

	Date Submitted	Date Provided
Close-out Documentation Manual:	_____	_____
Operation and Maintenance Manuals:	_____	_____
Owner Performance Verification and Demonstrations:	_____	_____
Manufacturer's Performance Verification Memos:	_____	_____
Manufacturer's Test Data:	_____	_____
Record Documents:	_____	_____

EXHIBIT B
PERFORMANCE VERIFICATION AND DEMONSTRATION TO OWNER
DESTIN-FORT WALTON BEACH AIRPORT

This form verifies that the Owner has been given a demonstration of the proper operation on the equipment or systems noted below.

Project Name: ITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE "C"

Specification Division Number & Name: _____

Equipment/Systems Demonstrated: _____

Along with a complete demonstration of the equipment/system, these items have been reviewed at this demonstration and shall be included in the Operation and Maintenance Manuals, under the appropriate specification section:

1) Written operating instructions.
2) Test data and performance verification information as required by the installer and/or manufacturer.
3) Maintenance information published by manufacturer's representative.
4) Check-out Memo signed by manufacturer's representative.
5) Printed warranties by manufacturer of equipment.
6) Explanation of the warranty/guarantee on the system.
7) Prints showing actual "As-Built" conditions.

_____
(Name of General Contractor) (Signature, Title, Date)

_____
(Name of Subcontractor) (Signature, Title, Date)

A demonstration of the system/equipment in operation and of the maintenance procedures has been successfully completed.

Destin-Fort Walton Beach Airport

_____
(Signature, Date) (VPS Department)

EXHIBIT C
CHECK-OUT MEMO
DESTIN-FORT WALTON BEACH AIRPORT

This form shall be completed and a copy provided to the Owner at the Owner's Performance Verification and Demonstration meeting. A copy shall also be included in the specification section of the Operation and Maintenance Manual for the equipment checked.

Project Name: ITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE "C"

Type of Equipment Checked: _____

Equipment Number: _____

Name of Equipment Manufacturer: _____

Signature below by the Manufacturer's authorized representative signifies that the equipment has been satisfactorily tested and checked out on the job by the manufacturer.

1. The attached Test Data and Performance Verification information was used to evaluate the equipment installation and operation.

2. The equipment is properly installed, has been tested by the manufacturer's authorized representative, and is operating satisfactorily in accordance with all requirements, except for items noted below. *

3. Written operating and maintenance information has been presented to the Contractor, and gone over with him in detail.

4. Sufficient copies of all applicable operating and maintenance information, part lists, lubrication checklists, and warranties have been furnished to the Contractor for insertion in the Operation and Maintenance Manuals.

Manufacturer's Representative: _____
(Print or Type Name and Title)

_____
(Print or Type Address and Phone Number)

Signature of Manufacturer's Representative: _____
Date Checked
Witnessed By: _____
(Signature and Title of Contractor's Representative)

*Exceptions Noted at Time of Check-Out: (Use additional pages if necessary.)

EXHIBIT D
PROGRESS AND AS-BUILT DRAWING CERTIFICATION
DESTIN-FORT WALTON BEACH AIRPORT

This form shall be completed and submitted with the As-Built Documents. Submit one form for each contractor/subcontractor providing as-built information. Include a copy of this form in the Close-out Documentation Manual.

Project Name: ITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE "C"

Specification Division Number & Name: _____

The Contractor's and Subcontractor's signatures below certify that the attached drawings and specifications were marked and revised as items were installed/changed during the course of construction, and that these documents represent and accurate "As-Built" condition of the work as actually installed.

_____
(Name of General Contractor)

_____
(Signature, Title, Date)

_____
(Name of Subcontractor)

_____
(Signature, Title, Date)

EXHIBIT E
SPARE PARTS CERTIFICATION MEMO
(Refer to Division 16 Specifications)

This form shall be completed and a copy provided to the Owner at the Owner's Performance Verification and Demonstration meeting. A copy shall also be included in the specifications section of each Operation and Maintenance Manual for the equipment checked.

Name of Project: ITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE "C"

Type of Spare Parts: _____

Specification Reference: _____

Quantity of Spare Parts: _____

Signature below by the Contractor and subcontractor signifies that the spare parts required by the drawings and/or specifications have been turned over to the Owner. Signature by the Owner acknowledges receipt of the same spare parts.

Name of General Contractor: _____

Authorized Signature and Title: _____

Date: _____

Name of Subcontractor: _____

Authorized Signature and Title: _____

Date: _____

Name of Owner: _____

Authorized Signature and Title: _____

Date: _____

EXHIBIT F
EXISTING FACILITIES INVESTIGATION MEMO
(Refer to Specification Section 16061)

Name of Project: ITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE "C"

The existing systems on the above project have been investigated and checked to determine the existing condition of all existing electrical systems within the area(s) affected by the scope of work on this project. The investigation consisted of testing all electrical systems/devices as required by Section 16061 of these specifications.

All equipment was found to be operational except as noted herein:

_____

_____

_____

_____

_____

_____

Name of Prime Contractor: _____

Authorized Signature and Title: _____
Date
Name of Authorized Owner Representative: _____

Authorized Signature and Title: _____
Date

Note To Contractor: Upon completion of investigation and one week prior to the commencement of work, submit five copies of the completed EXISTING FACILITIES INVESTIGATION MEMO to the Owner's Authorized Representative, signed and dated by the Contractor. The Owner's Resident Professional Representative signature and date is required to verify receipt of memo. Retain copy(ies) and submit copy of MEMO in each Operation and Maintenance Manual. Contractor shall submit quantities of Memos as required to present required information.

EXAMPLE - Description Sheet - Cover

Okaloosa County

DESTIN-FORT WALTON BEACH AIRPORT

ITB AP 21-21 CONSTRUCTION OF
SATELLITE CONCOURSE “C”

OPERATION AND MAINTENANCE MANUAL

EXAMPLE - Description Sheet - Spine

Okaloosa County

DESTIN-FORT WALTON BEACH AIRPORT

ITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE “C”

ELECTRICAL

OPERATION AND MAINTENANCE MANUAL

Okaloosa County

DESTIN-FORT WALTON BEACH AIRPORT

ITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE “C”

SYSTEMS

OPERATION AND MAINTENANCE MANUAL

END OF SECTION 01 78 00

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SECTION 01 78 10 – WARRANTIES

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes sample warranties to be executed by the General Contractor and Subcontractors.

1.2 GENERAL REQUIREMENTS

A. Forms:

1. Subcontractor Warranty (FORM 01 78 10-1)
2. General Contractor Warranty (FORM 01 78 10-2)

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 FORM

A. See attached forms in this section

END OF SECTION 01 78 10

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FORM 01 78 10-1

SUBCONTRACTOR WARRANTY

PROJECT NAME: ITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE "C"

OWNER: Okaloosa County Board of County Commissioners

Architect of Record: MLM-Martin Architects, Inc.

General Contractor: XXXXXXXXXXXXX

SCOPE OF WORK: XXXXXXXXXXXXX

LENGTH OF WARRANTY: X Year(s)

STARTING DATE: XXXXXXX x, XXXX (Substantial Completion Date)

This document shall warrant that the materials and/or equipment furnished, or work performed by (Company Name), (hereafter called "Subcontractor") in connection with XXXXXXXXXXXXXXXXX (hereafter called "Project") under the Subcontract or Purchase Agreement between _____(hereafter called "General Contractor") and the Subcontractor fully conforms to all requirements of the Contract Documents and is free of any defect in equipment, material, design furnished, or workmanship performed by the Subcontractor. This warranty shall continue for a period of X year(s) commencing on the Substantial Completion Date for the aforementioned Project as determined by Okaloosa County Board of County Commissioners, (hereafter called "Owner"), except to the extent any longer warranty period is called for by the Contract Documents with respect to equipment, material, design furnished, or workmanship performed by the Subcontractor. Work not conforming to these requirements including substitutions not properly approved and authorized may be considered defective. The Subcontractor agrees to promptly make good, without cost to the General Contractor or the Owner, any and all defects due to faulty equipment, material, design furnished, or workmanship performed by the Subcontractor, which may appear within the established warranty period. Failure to make good such defects within X days after notification may cause the corrective work to be performed by others at the Subcontractor's expense. All expenses necessary to replace or repair work will be the Subcontractor's responsibility including that damaged or disturbed by making replacement or repairs. This warranty is in addition to and not in lieu of all other guarantees, warranties and rights contained in the Contract Documents or applicable law. In the event that an equipment, material, design furnished, or workmanship performed by the Subcontractor is repaired or replaced pursuant to these warranty provisions, the Subcontractor shall extend the warranty period with respect to the equipment, material, design furnished, or workmanship performed by the Subcontractor so repaired or replaced for any additional period of time after Owner approval of the repair or

replacement specified in the Contract Documents.

The Subcontractor hereby acknowledges that this warranty is given for the benefit of the Owner and General Contractor and agrees to honor requests or directives issued to the Subcontractor by the Owner or General Contractor for enforcement of this warranty. The Subcontractor further hereby assigns to the Owner all warranties, express or implied, issued by the Subcontractor and by manufacturers, suppliers, or subcontractors to the Subcontractor for equipment, material, design furnished, or workmanship performed by the Subcontractor in connection with the Project.

IN WITNESS WHEREOF, THE Subcontractor has caused this instrument to be signed and executed this X day of XXXXXXX, 20XX.

FIRM:

BY:

TITLE:

State of_
County of_

SS.

On (*enter date*) before me, (*enter Notary's Name here*), Notary Public, personally appeared (*here insert name and title of person signing the instrument*) who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.
I certify under PENALTY OF PERJURY under the laws of the State of that the foregoing paragraph is true and correct.
WITNESS my hand and official seal.

Signature:

(Seal)

My Commission Expires:

FORM 01 78 10-2

General Contractor WARRANTY

PROJECT NAME: ITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE "C"

OWNER: Okaloosa County Board of County Commissioners

Architect of Record: MLM-Martin Architects, Inc.

General Contractor: XXXXXXXXXXXXX

SCOPE OF WORK: XXXXXXXXXXXXX

LENGTH OF WARRANTY: X Year(s)

STARTING DATE: XXXXXXX x, XXXX (Substantial Completion Date)

This document shall warrant that the materials and/or equipment furnished, or work performed by , (hereafter called " General Contractor ") in connection with XXXXXXXXX, (hereafter called "Project") under the Agreement between Okaloosa County Board of County Commissioners (hereafter called "Owner") and the General Contractor fully conforms to all requirements of the Contract Documents and is free of any defect in equipment, material, design furnished, or workmanship performed by the General Contractor. This warranty shall continue for a period of X year(s) commencing on the Substantial Completion Date for the aforementioned Project as determined by the Owner, except to the extent any longer warranty period is called for by the Contract Documents with respect to equipment, material, design furnished, or workmanship performed by the General Contractor. Work not conforming to these requirements including substitutions not properly approved and authorized may be considered defective. The General Contractor agrees to promptly make good, without cost to the Owner, any and all defects due to faulty equipment, material, design furnished, or workmanship performed by the General Contractor, which may appear within the established warranty period. Failure to make good such defects within X days after notification may cause the corrective work to be performed by others at the General Contractor expense. All expenses necessary to replace or repair work will be the General Contractor responsibility including that damaged or disturbed by making replacement or repairs. This warranty is in addition to and not in lieu of all other guarantees, warranties and rights contained in the Contract Documents or applicable law. In the event that equipment, material, design furnished, or workmanship performed by the General Contractor is repaired or replaced pursuant to these warranty provisions, the General Contractor shall extend the warranty period with respect to the equipment, material, design furnished, or workmanship performed by the General Contractor so repaired or replaced for any additional period of time after Owner approval of the repair or replacement specified in the Contract Documents. The General Contractor hereby acknowledges that this warranty is given

for the benefit of the Owner and agrees to honor requests or directives issued to the General Contractor by the Owner for enforcement of this warranty. The General Contractor further hereby assigns to the Owner all warranties, express or implied, issued by the General Contractor and by manufacturers, suppliers, or subcontractors to the General Contractor for equipment, material, design furnished, or workmanship performed by the General Contractor in connection with the Project.

IN WITNESS WHEREOF, THE General Contractor has caused this instrument to be signed and executed this X day of XXXXXXX, 20XX.

FIRM:

BY:

TITLE:

State of_
County of_
SS.

On (*enter date*) before me, (*enter Notary's Name here*), Notary Public, personally appeared (*here insert name and title of person signing the instrument*) who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.
I certify under PENALTY OF PERJURY under the laws of the State of that the foregoing paragraph is true and correct.
WITNESS my hand and official seal.

Signature:

(Seal)

My Commission Expires:

SECTION 01 79 00 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes administrative and procedural requirements for instructing Owner's personnel were indicated in other sections, including the following:

1. Instruction in operation and maintenance of systems, subsystems, and equipment.
2. Demonstration and training video recordings.

1.3 INFORMATIONAL SUBMITTALS

A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

B. Qualification Data: For facilitator.

C. Attendance Record: For each training module, submit list of participants and length of instruction time.

D. Evaluations: For each participant and for each training module, submit results and documentation of performance-based test.

1.4 CLOSEOUT SUBMITTALS

A. Demonstration and Training Video Recordings: Submit two copies within seven days of end of each training module.

1. Identification: On each copy, provide an applied label with the following information:
   a. Name of Project.
   b. Name and address of videographer.
   c. Name of Owner.
   d. Name of Architect.
   e. Name of Construction Manager.

f. Name of Contractor.
g. Date of video recording.

2. Transcript: Prepared and bound in format matching operation and maintenance manuals. Mark appropriate identification on front and spine of each binder. Include a cover sheet with same label information as the corresponding video recording. Include name of Project and date of video recording on each page.
3. At completion of training, submit complete training manual(s) for Owner's use prepared in same format required for operation and maintenance manuals specified in Section 01 78 00 “Closeout Submittals”.

1.5 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements, experienced in operation and maintenance procedures and training.

C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 01 31 19 "Project Meetings”. Review methods and procedures related to demonstration and training including, but not limited to, the following:

1.6 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Architect.

1.7 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is

expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
   a. System, subsystem, and equipment descriptions.
   b. Performance and design criteria if Contractor is delegated design responsibility.
   c. Operating standards.
   d. Regulatory requirements.
   e. Equipment function.
   f. Operating characteristics.
   g. Limiting conditions.
   h. Performance curves.
2. Documentation: Review the following items in detail:
   a. Emergency manuals.
   b. Systems and equipment operation manuals.
   c. Systems and equipment maintenance manuals.
   d. Product maintenance manuals.
   e. Project Record Documents.
   f. Identification systems.
   g. Warranties and bonds.
   h. Maintenance service agreements and similar continuing commitments.
3. Emergencies: Include the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages.
   b. Instructions on stopping.
   c. Shutdown instructions for each type of emergency.
   d. Operating instructions for conditions outside of normal operating limits.
   e. Sequences for electric or electronic systems.
   f. Special operating instructions and procedures.
4. Operations: Include the following, as applicable:
   a. Startup procedures.
   b. Equipment or system break-in procedures.
   c. Routine and normal operating instructions.
   d. Regulation and control procedures.
   e. Control sequences.
   f. Safety procedures.
   g. Instructions on stopping.
   h. Normal shutdown instructions.
   i. Operating procedures for emergencies.
   j. Operating procedures for system, subsystem, or equipment failure.
   k. Seasonal and weekend operating instructions.
   l. Required sequences for electric or electronic systems.
   m. Special operating instructions and procedures.
5. Adjustments: Include the following:
   a. Alignments.

b. Checking adjustments.
c. Noise and vibration adjustments.
d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:
   a. Diagnostic instructions.
   b. Test and inspection procedures.
7. Maintenance: Include the following:
   a. Inspection procedures.
   b. Types of cleaning agents to be used and methods of cleaning.
   c. List of cleaning agents and methods of cleaning detrimental to product.
   d. Procedures for routine cleaning.
   e. Procedures for preventive maintenance.
   f. Procedures for routine maintenance.
   g. Instruction on use of special tools.
8. Repairs: Include the following:
   a. Diagnosis instructions.
   b. Repair instructions.
   c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   d. Instructions for identifying parts and components.
   e. Review of spare parts needed for operation and maintenance.

1.8 PREPARATION

A. Assemble educational materials necessary for instruction, including documentation and training module.

B. Set up instructional equipment at instruction location.

1.9 INSTRUCTION

A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.

B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.

C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

   1. Schedule training with Owner, through Construction Manager, with at least seven days' advance notice.

D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.

E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

F. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

1.10 DEMONSTRATION AND TRAINING VIDEO RECORDINGS

A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include

classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.

1. At beginning of each training module, record each chart containing learning objective and lesson outline.

B. Digital Video Recordings: Provide high-resolution, digital video in MPEG format, produced by a digital camera with minimum sensor resolution of 12 megapixels and capable of recording in full HD mode with vibration reduction technology.

1. Submit video recordings on DVD or thumb drive.
2. File Hierarchy: Organize folder structure and file locations according to Project Manual table of contents. Provide complete screen-based menu.
3. File Names: Utilize file names based on name of equipment generally described in video segment, as identified in Project specifications.
4. Contractor and Installer Contact File: Using appropriate software, create a file for inclusion on the equipment demonstration and training recording that describes the following for each Contractor involved on the Project, arranged according to Project Manual table of contents:
   a. Name of Contractor/Installer.
   b. Business address.
   c. Business phone number.
   d. Point of contact.
   e. Email address.

C. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to adequately cover area of demonstration and training. Display continuous running time.

1. Film training session(s) in segments not to exceed 15 minutes.
   a. Produce segments to present a single significant piece of equipment per segment.
   b. Organize segments with multiple pieces of equipment to follow order of Project Manual table of contents.
   c. Where a training session on a particular piece of equipment exceeds 15 minutes, stop filming and pause training session. Begin training session again upon commencement of new filming segment.

D. Light Levels: Verify light levels are adequate to properly light equipment. Verify

equipment markings are clearly visible prior to recording.

1. Furnish additional portable lighting as required.

E. Narration: Describe scenes on video recording by audio narration by microphone while video recording is recorded. Include description of items being viewed.

F. Transcript: Provide a transcript of the narration. Display images and running time captured from videotape opposite the corresponding narration segment.

G. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 01 79 00

SECTION 02 31 00 - GEOPHYSICAL INVESTIGATION

The Following Report:	GEOTECHNICAL INVESTIGATION REPORT
Name of Report:	Report of Geotechnical Engineering Services New VPS Concourse Fort Walton Beach, Okaloosa County, Florida
Number of Report:	PSI Project 07832840
Report Prepared By:	Professional Services Industries, Inc. 175 South A Street Pensacola, Florida 32502
Date of Report:	August 8, 2019
Contact:	Phil Kauzarich, P.E. 859-434-1000 PHILLIP.KAUZLARICH@intertek.com

The above listed report is part of the specification for "Information Available to Contractors" on site conditions and recommendations for soil modification, fill material and compaction.

The above listed report includes 24 pages is attached and follows this page.

End of Section 02 31 00

Report of Geotechnical Engineering Services
New VPS Concourse
Fort Walton Beach, Okaloosa County, Florida

Prepared for

Infrastructure Consulting and Engineering
5550 West Idlewild Avenue, Suite 102
Tampa, Florida 33634

Prepared by

Professional Service Industries, Inc.
175 South A Street
Pensacola, Florida 32502

August 8, 2019

PSI Project 07832840

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Principal Consultant

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FIGURES
FIGURE 1 – USGS Vicinity Map
FIGURE 2 – NRCS Soil Survey Map
FIGURE 3 – Boring Location Plan

Boring Logs

1 PROJECT INFORMATION

1.1 PROJECT DESCRIPTION

We understand that Fort Walton Beach – Destin Airport (VPS) plans to construct a new approximately 37,000 square-foot two-story concourse facility to the southwest of their existing facility in Fort Walton Beach, Okaloosa County, Florida, as shown on the Vicinity Map (Figure 1) presented in the Appendix. Construction will consist of a slab-on-grade structure utilitizing shallow foundations.

Details regarding the proposed development including grading or structural loading information were not provided to PSI. Based on our current project understanding, maximum column and wall loads are anticipated to be approximately 150 kips and 3 kips per lineal foot; respectively. We anticipate relatively minor grading with cuts and/or fills of 2 feet or less required to achieve proposed grades.

Should any of the above information be inconsistent with the planned construction, PSI requests that you contact us immediately to allow us to make any necessary modifications to this report.

1.2 PURPOSE AND SCOPE OF WORK

The purpose of this exploration was to obtain information on the general subsurface soil and groundwater conditions at the proposed project site. The subsurface conditions encountered were then evaluated with respect to the provided project characteristics. In this regard, geotechnical engineering assessments for the following items were formulated.

1. Geologic review of the project site;
2. Subsurface conditions encountered including pertinent soil properties;
3. Soil or rock data review/analysis as it relates to the proposed development;
4. Geotechnical recommendations for site preparation, and placement and compaction of fill;
5. Comments relating to observed geotechnical conditions such as shallow auger refusal or groundwater which could impact development;
6. Geotechnical recommendations for the design and construction of foundations and floor slabs for the proposed concourse including allowable soil bearing capacity, estimated potential settlements, minimum foundation widths and depths of embedment.

The following services were provided in order to achieve the preceding objectives:

1. Reviewed the “Fort Walton Beach, FL, 2014” quadrangle map published by the United States Geological Survey (USGS) and the "Custom Soil Survey of Okaloosa County, Florida" published by the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS).
2. Executed a program of subsurface sampling and field testing which included six (6) soil test borings drilled in the proposed building area to a depth of 20 feet each below existing grade.
3. Visually classified and stratified representative soil samples in the laboratory using the Unified Soil Classification System. Conducted a limited laboratory testing program to assist with soil classifications. Identified soil conditions at each boring location and formed an opinion of the site soil stratigraphy.

1.3 REVIEW OF PUBLISHED DATA

1.3.1 USGS TOPOGRAPHIC MAP

The topographic survey map published by the (USGS) entitled “Fort Walton Beach, Florida” was reviewed. Based on this review, the natural ground surface elevation is approximately +82 to +88 feet National American Datum (NAD, 1983) and is generally downsloping to the south. Existing topographic information for the site was not provided to PSI.

1.3.2 NRCS SOIL MAP

The "Custom Soil Survey of Okaloosa County, Florida" published by the USDA NRCS, was reviewed for general near-surface soil information within the project vicinity. This information indicates that there is one primary mapping unit within the vicinity of the proposed project. The mapped soil unit depicted by the NRCS is summarized in the following table.

NRCS Soil Mapping Units Summary Table			
Soil Series	**Depth (inches)**	**Unified Classification**	**USDA Estimated Seasonal High Groundwater Table Depth (inches)**
12 – Lakeland Sand, 0 to 5 Percent Slopes	0 – 7 7 – 80	SP SP	> 80

Excerpts of the USGS “Fort Walton Beach, Florida” topographic map (Figure 1) and NRCS Okaloosa County Soil Survey map (Figure 2) showing the approximate site location are included in the Appendix.

2 FIELD EXPLORATION AND LABORATORY TESTING

2.1 FIELD EXPLORATION

The approximate locations of our Standard Penetration Test (SPT) borings are shown on Sheet 1 in the Appendix. The boring locations were selected by MLM Architects. The borings were located in the field by estimating distances from existing features identified on the plans provided and should be considered approximate.

The SPT borings were performed in general accordance with the procedures of ASTM D-1586. SPT samples were obtained at 2-foot intervals to a depth of 10 feet and at approximate 5-foot depth intervals thereafter. Soil Samples were obtained in the SPT borings by driving a standard 2-inch (O.D.) split-spoon sampler a distance of 24 inches using a 140-lb hammer dropped from a height of 30 inches. The number of blows required to drive the standard split spoon sampler the middle 12 inches is known as the penetration resistance (N-value) measured in blows per foot (bpf). Penetration resistance values provide an indication of the relative density of granular soils, such as sand, and the relative consistency of cohesive soils, such as clay or silt.

Samples from the SPT borings were placed in sealed containers and transported to PSI's soils and materials laboratory for further examination and testing. Upon completion of the SPT borings, the boreholes were backfilled to existing grade with soil cuttings. The results of the borings are presented in the Appendix in the form of soil profiles.

Included with the boring profiles is a legend describing the encountered soils in Unified Soil Classification System (USCS) format, measured groundwater levels and laboratory test results. The soil stratification presented is based on visual observation of the recovered samples, interpretation of field logs by a geotechnical engineer and the results of the laboratory testing. It should be noted that variations in the subsurface conditions are expected and may be encountered between and away from the boring. Also, whereas the individual boring logs indicate distinct strata breaks, the actual transition between the soil layers may be more gradual than shown on the soil profiles.

2.2 LABORATORY TESTING

Representative samples of soil obtained from the borings were tested to determine physical and engineering properties. The laboratory testing program included determinations of natural moisture content, and fines content. The laboratory results of the soil indices testing are presented adjacent to the individual soil profiles in the Appendix.

3 SITE AND SUBSURFACE CONDITIONS

3.1 SITE CONDITIONS

The proposed site is a parcel of land located to the southwest of the existing Fort Walton Beach – Destin Airport (VPS) in Fort Walton Beach, Okaloosa County, Florida. The existing site conditions were observed by a PSI representative on August 5, 2019. At the time of our visit, the site was relatively level and dry with no standing water observed. Ground cover primarily consisted of soil and vegetation including mature trees.

3.2 SUBSURFACE CONDITIONS

In general, the SPT borings performed at the site encountered very loose to medium dense slightly silty sand (SP-SM materials) from the existing ground to the maximum depth explored of about 20 feet below existing grade. The soils encountered were very loose to loose in the upper 12 feet of the borings performed. Boring B-1 was performed in an existing parking lot, and encountered 3¼ inches of asphalt, with 6 inches of aggregate base on top of the sand with silt.

3.3 GROUNDWATER

Groundwater was not apparent within the borings performed to the maximum depth explored of about 20 feet at the time of drilling. In this regard, we estimate the depth to the normal wet seasonal high groundwater table (SHWT) to be greater than 6 feet below current site grades.

In general, the estimated normal seasonal high groundwater level is not intended to define a limit or ensure that future seasonal fluctuations in groundwater levels will not exceed the estimated levels. Groundwater conditions will vary with environmental changes and seasonal conditions, such as, the frequency and magnitude of rainfall patterns, as well as man-made influences, such as swales, drainage ponds, underdrains, stormwater collection systems and areas of covered soil (buildings, paved parking lots, sidewalks, etc.). We recommend that the Contractor determine the actual groundwater level at the site at the time of the construction activities.

4 RECOMMENDATIONS

4.1 GENERAL

Existing pavements in the northern portion of the proposed concourse, will require removal prior to the proposed site development. Very loose to loose soils were encountered to depths on the order of 12 feet below current grades. Proposed structural loads were not provided. We recommend anticipated structural loads and settlement tolerances of the proposed structure be provided for our review. We recommend undercutting the upper three feet of soil and compacting the exposed grade with a large vibratory roller (at least 25 tons). A roller of this size should be capable of improving the very loose to loose sands to a depth of 3 to 4 feet. Compaction of the exposed subgrade should continue until a minimum density of 95% of the Modified Proctor maximum dry density is achieved. The stripped materials can then be reused as Engineered Fill to bring the site up to proposed grades. Care should be taken during site preparation activities to adequately compact soils supporting the proposed foundations. Any existing structures within 100 feet of the proposed concourse should be monitored during compaction operations.

Site preparation activities should be conducted under the full-time supervision of a PSI representative to ensure the prepared subgrade is capable of satisfactorily supporting the proposed development.

Once final design plans and specifications are available, a general review by PSI is strongly recommended as a means to check that the evaluations made in preparation of this report are correct and that earthwork and foundation recommendations are properly interpreted and implemented.

4.2 SITE PREPARATION

The following are our recommendations for general site preparation. These recommendations should be used as a guideline for the project general specifications prepared by the design engineer.

1. Vegetation in proposed construction areas should be stripped from the ground surface and removed. The existing pavements at the site should be demolished and removed. Any subsurface utilities not planned to be incorporated into the proposed construction should also be removed. It is possible that unsuitable materials or previously placed fills exist at the site. Should these materials be encountered we recommend that they be completely undercut and removed.

2. Following site stripping, we recommend undercutting at least 3 feet of soil. The undercut should extend at least 5 feet beyond the proposed building footprint. The exposed subgrade should be compacted to a minimum of 95% of the soil's modified Proctor maximum dry density using a large vibratory roller (minimum 25 tons). Areas where the recommended compaction cannot be achieved should be undercut to firm soils and replaced with compacted engineered fill.

3. Following compaction, development areas may be brought up to finished subgrade levels using engineered fill. The undercut materials should be satisfactory for reuse as Engineered Fill provided they are free of organic or deleterious materials. Some imported fill may be required after the very loose to loose sands are compacted. Fill soils should be tested and approved by PSI prior to hauling to the site. Imported fill (engineered fill) should consist of fine sand with less than 12% passing the No. 200 sieve, free of significant

rocks/rubble, organics, clay, debris and other unsuitable material. Fill should be tested and approved prior to acquisition. Approved sand fill should be placed in loose lifts not exceeding 12 inches in thickness and should be compacted to a minimum density of 95% of the Modified Proctor maximum dry density. Density tests to confirm compaction should be performed in each fill lift before the next lift is placed.

4. Prior to beginning compaction, soil moisture contents may need to be controlled in order to facilitate proper compaction. If additional moisture is necessary to achieve compaction objectives, then water should be applied in such a way that it will not cause erosion or removal of the subgrade soils. A moisture content within the percentage range needed to achieve compaction (typically +/- 2%) is recommended prior to compaction of the natural ground and fill.

A representative from our firm should be retained to provide full-time, on-site observation of earthwork and excavation activities. It is important that PSI be retained to observe that the subsurface conditions are as we have discussed herein, and that fill placement is in accordance with our recommendations.

4.3 FOUNDATION RECOMMENDATIONS

Following site preparation as previously recommended, it is our opinion the proposed buildings can be supported on conventional spread footing foundations bearing on approved properly compacted Engineered Fill in accordance with the recommendations of this report. Column footings and continuous wall foundations can be designed for a net allowable soil bearing pressure of 2,000 pounds per square foot, based on dead load plus design live load.

Exterior footings should bear at a depth of at least 18 inches below the final exterior grade. Interior footings may bear on properly compacted soils at a minimum depth of 12 inches, if desired.

The foundation excavations should be observed by a representative of PSI prior to steel or concrete placement to confirm that the compacted foundation materials are capable of supporting the design loads and are consistent with the materials discussed in this report. If the foundation excavations appear suitable as load bearing materials, the bottom of the foundation excavations should be compacted to a minimum density of 95% of the soil's modified Proctor maximum dry density for a minimum depth of one foot below the bottom of the footing depth, as determined by field density compaction tests. Soft or loose soil zones encountered at the bottom of the footing excavations should be removed and replaced with engineered fill soils (as directed above), lean concrete or graded compacted crushed stone (FDOT No. 57) compacted to a firm and unyielding condition.

After opening, footing excavations should be observed and concrete placed as quickly as possible to avoid exposure of the footing bottoms to wetting and drying. Surface run-off water should be drained away from the excavations and not be allowed to pond. The foundation concrete should be placed promptly after the excavation is made.

4.4 SETTLEMENT

The settlement of shallow foundations supported on compacted sandy soils should occur rapidly after loading. Thus, the majority of the expected settlement should occur during construction as structural loads are imposed. Provided the recommended site preparation operations are properly performed, any organic, previous fill, or deleterious materials encountered during site preparation or proof-rolling have been removed, and the

recommendations previously stated are utilized, the total settlement of wall and isolated column footings should not exceed 1 inch. Differential settlement between adjacent columns or across approximately 20 feet of continuous footing length is estimated to be on the order of 50 percent of the total settlement. Settlement of this magnitude is usually considered tolerable for most structures; however, the tolerance of the proposed structure to the predicted total and differential settlement should be confirmed by the structural engineer.

4.5 FLOOR SLAB RECOMMENDATIONS

Slab-on-grade construction should be supported on soils compacted to a minimum dry density of at least 95% of their modified Proctor value. We have assumed no extraordinary floor slab performance requirements such as very low allowable deflections or smoothness requirements are necessary. Any cuts that are made in the building pad for utility installation should be backfilled with compacted engineered fill that are compacted to at least 95 percent of their ASTM D-1557 maximum dry density. Material to be placed within 12 inches of the bottom of the slab should have no single particle greater than 3 inches in size and should meet the requirements of approved structural fill.

The floor slab should be adequately reinforced to reduce the risk of cracking due to differential settlement. An impervious membrane should be installed between the soil subgrade and bottom of floor slabs to be overlain with moisture sensitive coverings to avoid slab moisture problems. Floor slab design should conform to American Concrete Institute (ACI) design standards and practices.

5 CONSTRUCTION CONSIDERATIONS

5.1 GENERAL

It is recommended that PSI be retained to provide observation and testing of construction activities involved in the foundation, earthwork and related activities of this project. This will promote project continuity and will reduce the potential for misinterpretation of our recommendations.

5.2 UTILITY EXCAVATIONS

Utility trenches may be required for this project. We recommend all utility trench backfill comply to the gradation and requirements of structural fill, as described above and be placed and compacted to the recommendations contained in the site preparation section of this report. This fill should be compacted to a minimum of 95% of its modified Proctor value.

5.3 DRAINAGE CONCERNS

Water should not be allowed to collect in excavations, on floor slab areas, or on prepared subgrades of the construction area either during or after construction. Undercut or excavated areas should be sloped toward one corner to facilitate removal of any collected rainwater, groundwater, or surface runoff. Positive site surface drainage should be provided to reduce infiltration of surface water around the perimeter of the building and beneath the floor slabs. The grades should be sloped away from the building and surface drainage should be collected and discharged such that water is not permitted to infiltrate the backfill and floor slab areas of the building.

5.4 EXCAVATIONS

In Federal Register, Volume 54, No. 209 (October 1989), the United States Department of Labor, Occupational Safety and Health Administration (OSHA) amended its “Construction Standards for Excavations, 29 CFR, Part 1926, Subpart P”. This document was issued to better insure the safety of workmen entering trenches or excavations. It is mandated by this federal regulation that excavations, whether they be utility trenches, general construction excavations or footing excavations, be constructed in accordance with current OSHA guidelines. It is our understanding that these regulations are strictly enforced and if they are not closely followed, the owner and the contractor could be liable for substantial penalties.

The contractor is solely responsible for designing and constructing stable, temporary excavations and should shore, slope, or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. The contractors “responsible person”, as defined in 29 CFR, Part 1926, should evaluate the soil exposed in the excavations as part of the contractor’s safety procedures. In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in all local, state, and federal safety regulations.

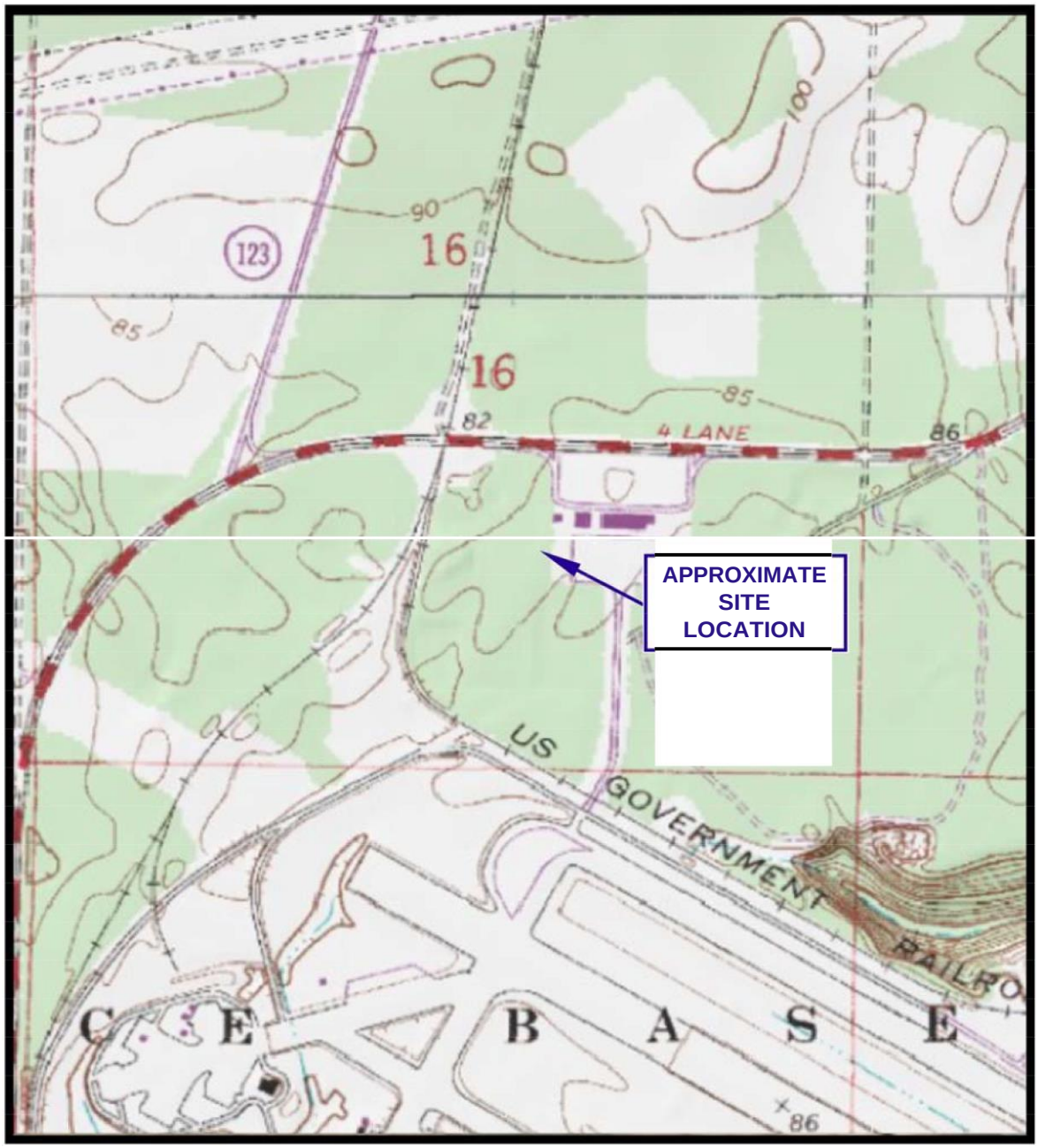
We are providing this information solely as a service to our client. PSI does not assume responsibility for construction site safety or the contractor’s or other party’s compliance with local, state, and federal safety or other regulations. It is the policy of PSI not to provide recommendations regarding temporary slopes during construction which is the sole responsibility of the contractor as indicated above.

6 REPORT LIMITATIONS

Our professional services have been performed, our findings obtained, and our recommendations prepared in accordance with generally accepted geotechnical engineering principles and practices. This company is not responsible for the conclusions, opinions or recommendations made by others based on these data.

The scope of our exploration was intended to evaluate soil conditions within the influence of the proposed structure foundations and does not include an evaluation of potential deep soil problems such as sinkholes. The analysis and recommendations submitted in this report are based upon the data obtained from the soil borings performed at the locations indicated and does not reflect any variations which may occur between or away from the borings. If any subsoil variations become evident during the course of this project, a re-evaluation of the recommendations contained in this report will be necessary after we have had an opportunity to observe the characteristics of the conditions encountered. The applicability of the report should also be reviewed in the event significant changes occur in the design, nature or location of the proposed construction.

The scope of our services does not include any environmental assessment or investigation for the presence or absence of hazardous or toxic materials in the soil, groundwater, or surface water within or beyond the site studied. Any statements in this report regarding odors, staining of soils, or other unusual conditions observed are strictly for the information of our client.



REFERENCE: U.S.G.S "FORT WALTON BEACH, FLORIDA" QUADRANGLE MAP

ISSUED: 2014
PHOTOREVISED: NIA
SCALE: UNKNOWN

VICINITY MAP

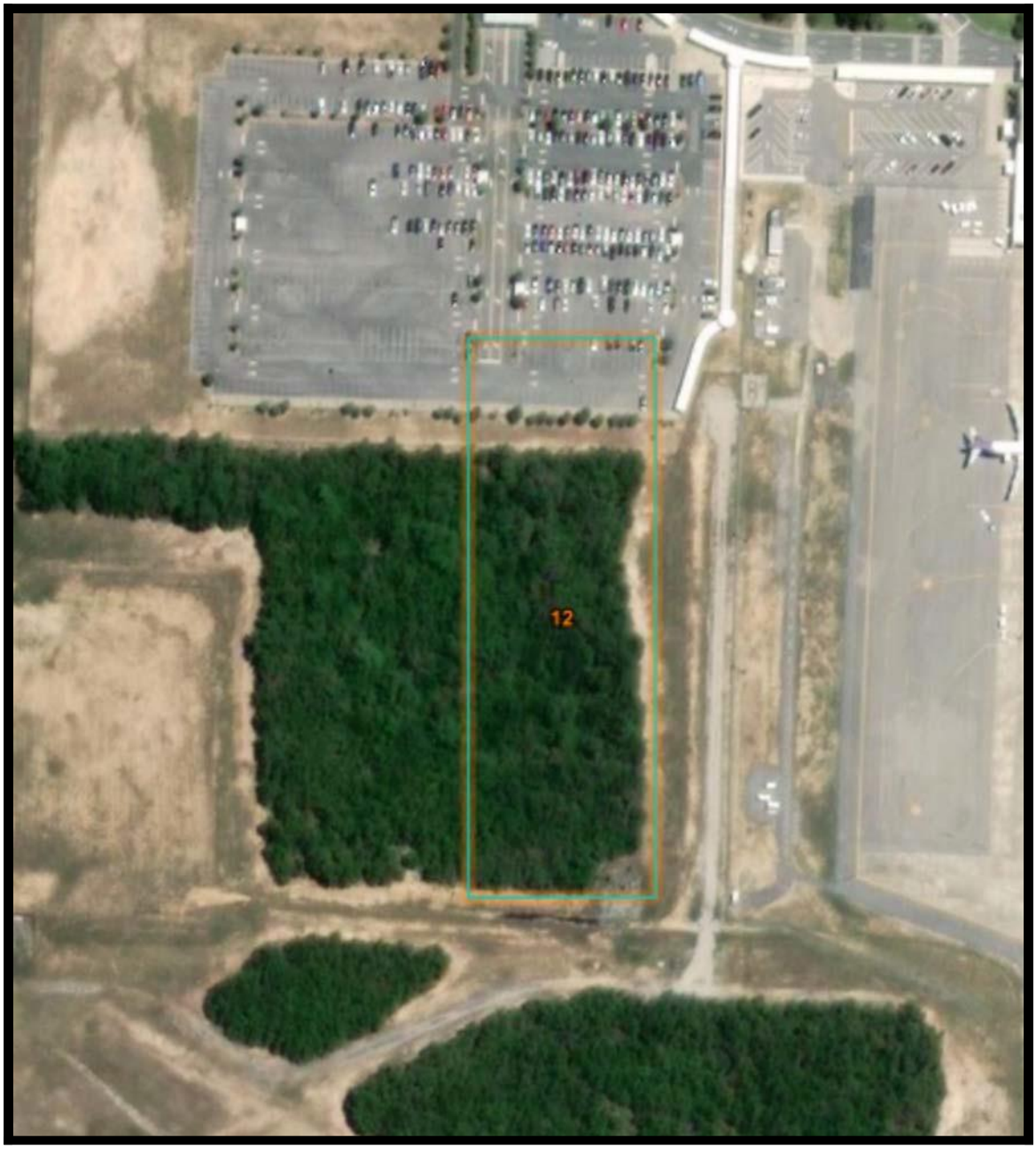
VPS CONCOURSE EXPANSION

FORT WALTON BEACH, OKALOOSA COUNTY, FLORIDA

Information To Build On

Engineering • Consulting • Testing

DRAWN: POK	SCALE: UKNOWN	PRO J. NO: 0783-2840
CHKD: LL	DATE: 8/6/2019	FIGURE:



REFERENCE: U.S.D.A.-N.R.C.S. "OKALOOSA COUNTY, FLORIDA" SOILS MAP

ISSUED: AUGUST 2019

SOILS LEGEND

12 Lakeland Sand, 0 to S Percent Slopes

SOILS MAP

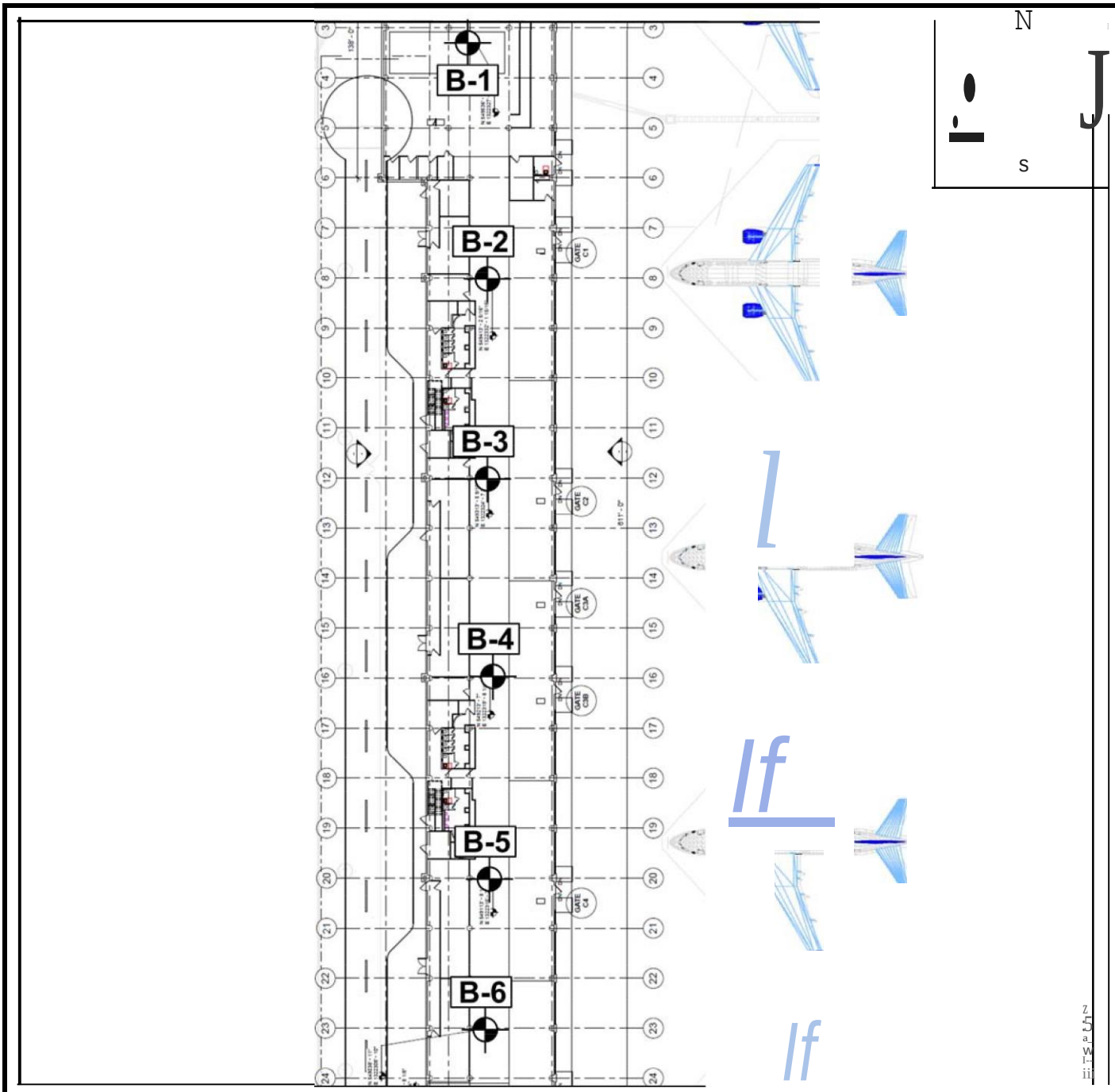
VPS CONCOURSE EXPANSION

FORT WALTON BEACH, OKALOOSA COUNTY, FLORIDA

Information To Build On

Engineering • Consulting • Testing

	PDK	SCALE:	NOTED	PROJ. NO:	078 3-2840
C KD	LL	DATE:	8 /6/2019	FIGURE:	2



BORING LOCATION PLAN

SCALE: UNKNOWN

LEGEND

B-1

APPROX/MATE LOCATION OF STANDARD PENETRATION TEST BORING

GEOTECHNICAL ENGINEERING SERVICES

VPS CONCOURSE EXPANSION

FORT WALTON BEACH, OKALOOSA COUNTY, FLORIDA

Information To Build On

Engineering • Consulting • Testing

DRAWN:	POK	SCALE:	NOTED	PRO J. NO:	0783-2840
CHKD:	LL	DATE:	8/6/2019	SHEET:	

BORING B-1

DATE STARTED:	8/5/19	DRILL COMPANY:	ERG, Inc.
DATE COMPLETED:	8/5/19	DRILLER: BK	LOGGED BY: PK
COMPLETION DEPTH	20.0 ft	DRILL RIG:	Hybrid
BENCHMARK:	N/A	DRILLING METHOD:	Solid Flight Auger
ELEVATION:	N/A	SAMPLING METHOD:	2-in SS
LATITUDE:		HAMMER TYPE:	Safety
LONGITUDE:		EFFICIENCY	N/A
STATION: N/A	OFFSET: N/A	REVIEWED BY:	

REMARKS: GNE = Groundwater Not Encountered

Water

While Drilling	GNE feet
Upon Completion	GNE feet
Delay	N/A

BORING LOCATION:

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ Moisture PL LL 0 25 50 STRENGTH, tsf ▲ Qu Qp 0 2.0 4.0	Additional Remarks
	0					ASPHALT: 3-1/4 Inches AGGREGATE BASE: 6 Inches Orange/Tan Loose to Medium Dense Fine-Grained SAND with Silt	ASPHALT BASE	N=20			
								N=16			
	5							N=8			
								N=6			
								N=7			
	10						SP-SM				
								N=15			
	15										
								N=19			
	20					Boring Terminated at 20 Feet					

intertek psi
Professional Service Industries, Inc.
175 S. "A" Street
Pensacola, FL 32502
Telephone: (850) 434-1000

PROJECT NO.: 07832840
PROJECT: VPS Concourse Expansion
LOCATION: Fort Walton Beach
Florida

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-2

DATE STARTED:	8/5/19	**DRILL COMPANY:**	ERG, Inc.
DATE COMPLETED:	8/5/19	**DRILLER:** BK	**LOGGED BY:** PK
COMPLETION DEPTH	20.0 ft	**DRILL RIG:**	Hybrid
BENCHMARK:	N/A	**DRILLING METHOD:**	Solid Flight Auger
ELEVATION:	N/A	**SAMPLING METHOD:**	2-in SS
LATITUDE:		**HAMMER TYPE:**	Safety
LONGITUDE:		**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	

REMARKS: GNE = Groundwater Not Encountered

Water

While Drilling	GNE	feet
Upon Completion	GNE	feet
Delay		N/A

BORING LOCATION:

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0					Orange/Tan Very Loose to Loose Fine-Grained SAND with Silt		N=1		
								N=4	6	-200 = 8.1%
	5						SP-SM	N=3		
								N=6		
								N=5	7	-200 = 6.3%
	10					Tan Medium Dense Fine-Grained SAND with Silt				
								N=13		
	15						SP-SM			
								N=18		
	20					Boring Terminate at 20 Feet				

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
Moisture ◪ PL ✚ LL
0 25 50
STRENGTH, tsf
▲ Qu Qp
0 2.0 4.0

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Florida

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BORING B-3

DATE STARTED:	8/5/19	**DRILL COMPANY:**	ERG, Inc.
DATE COMPLETED:	8/5/19	**DRILLER:** BK	**LOGGED BY:** PK
COMPLETION DEPTH	20.0 ft	**DRILL RIG:**	Hybrid
BENCHMARK:	N/A	**DRILLING METHOD:**	Solid Flight Auger
ELEVATION:	N/A	**SAMPLING METHOD:**	2-in SS
LATITUDE:		**HAMMER TYPE:**	Safety
LONGITUDE:		**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	

REMARKS: GNE = Groundwater Not Encountered

Water

While Drilling	GNE	feet
Upon Completion	GNE	feet
Delay		N/A

BORING LOCATION:

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, % (STANDARD PENETRATION TEST DATA: N in blows/ft; Moisture 0–25–50; PL; LL)	STRENGTH, tsf (Qu, Qp 0–2.0–4.0)	Additional Remarks
	0					Orange/Tan Very Loose to Loose Fine-Grained SAND with Silt					
								N=1			
								N=4			
	5							N=3			
							SP-SM				
								N=4			
								N=6			
	10					Tan Medium Dense Fine-Grained SAND with Silt					
								N=13			
	15						SP-SM				
								N=20			
	20					Boring Terminate at 20 Feet					

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The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-4

DATE STARTED:	8/5/19	DRILL COMPANY:	ERG, Inc.
DATE COMPLETED:	8/5/19	DRILLER: BK LOGGED BY:	PK
COMPLETION DEPTH	20.0 ft	DRILL RIG:	Hybrid
BENCHMARK:	N/A	DRILLING METHOD:	Solid Flight Auger
ELEVATION:	N/A	SAMPLING METHOD:	2-in SS
LATITUDE:		HAMMER TYPE:	Safety
LONGITUDE:		EFFICIENCY	N/A
STATION: N/A	OFFSET: N/A	REVIEWED BY:	

REMARKS: GNE = Groundwater Not Encountered

Water

While Drilling	GNE feet
Upon Completion	GNE feet
Delay	N/A

BORING LOCATION:

STANDARD PENETRATION TEST DATA
N in blows/ft
Moisture
PL
LL
0 25 50
STRENGTH, tsf
Qu Qp
0 2.0 4.0

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0					Orange/Tan Very Loose to Loose Fine-Grained SAND with Silt		N=3		
								N=2	7	-200 = 8.2%
	5							N=5	8	-200 = 7.3%
							SP-SM	N=6		
								N=6		
	10					Tan Medium Dense Fine-Grained SAND with Silt				
								N=12		
	15						SP-SM			
								N=19		
	20					Boring Terminate at 20 Feet				

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PROJECT: VPS Concourse Expansion
LOCATION: Fort Walton Beach
Florida

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-5

DATE STARTED:	8/5/19	**DRILL COMPANY:**	ERG, Inc.
DATE COMPLETED:	8/5/19	**DRILLER:** BK	**LOGGED BY:** PK
COMPLETION DEPTH	20.0 ft	**DRILL RIG:**	Hybrid
BENCHMARK:	N/A	**DRILLING METHOD:**	Solid Flight Auger
ELEVATION:	N/A	**SAMPLING METHOD:**	2-in SS
LATITUDE:		**HAMMER TYPE:**	Safety
LONGITUDE:		**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	

REMARKS: GNE = Groundwater Not Encountered

Water

While Drilling	GNE	feet
Upon Completion	GNE	feet
Delay		N/A

BORING LOCATION:

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	Additional Remarks
	0					Orange/Tan Very Loose to Loose Fine-Grained SAND with Silt		N=2		
								N=2		
	5							N=4		
								N=8		
							SP-SM	N=6		
	10							N=7	10	-200 = 5.8%
	15					Tan Medium Dense Fine-Grained SAND with Silt	SP-SM	N=16		
	20					Boring Terminate at 20 Feet				

STANDARD PENETRATION TEST DATA
N in blows/ft ◎
Moisture ◪ PL ✚ LL
0 25 50
STRENGTH, tsf
▲ Qu Qp
0 2.0 4.0

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PROJECT: VPS Concourse Expansion
LOCATION: Fort Walton Beach
Florida

The stratification lines represent approximate boundaries. The transition may be gradual.

BORING B-6

DATE STARTED:	8/5/19	**DRILL COMPANY:**	ERG, Inc.
DATE COMPLETED:	8/5/19	**DRILLER:** BK	**LOGGED BY:** PK
COMPLETION DEPTH	20.0 ft	**DRILL RIG:**	Hybrid
BENCHMARK:	N/A	**DRILLING METHOD:**	Solid Flight Auger
ELEVATION:	N/A	**SAMPLING METHOD:**	2-in SS
LATITUDE:		**HAMMER TYPE:**	Safety
LONGITUDE:		**EFFICIENCY**	N/A
STATION: N/A	**OFFSET:** N/A	**REVIEWED BY:**	

REMARKS: GNE = Groundwater Not Encountered

Water

While Drilling	GNE	feet
Upon Completion	GNE	feet
Delay	N/A	

BORING LOCATION:

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ◎ Moisture ◪ PL ✚ LL (0 25 50) STRENGTH, tsf ▲ Qu Qp (0 2.0 4.0)	Additional Remarks
	0					Orange/Tan Very Loose to Loose Fine-Grained SAND with Silt					
								N=3		◎	
								N=3		◎	
	5							N=4		◎	
							SP-SM				
								N=4		◎	
								N=4		◎	
	10					Tan Medium Dense Fine-Grained SAND with Silt					
								N=13		◎	
	15						SP-SM				
								N=18		◎	
	20					Boring Terminate at 20 Feet					

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PROJECT NO.: 07832840
PROJECT: VPS Concourse Expansion
LOCATION: Fort Walton Beach
Florida

The stratification lines represent approximate boundaries. The transition may be gradual.

GENERAL NOTES

SAMPLE IDENTIFICATION

The Unified Soil Classification System (USCS), AASHTO 1988 and ASTM designations D2487 and D-2488 are used to identify the encountered materials unless otherwise noted. Coarse-grained soils are defined as having more than 50% of their dry weight retained on a #200 sieve (0.075mm); they are described as: boulders, cobbles, gravel or sand. Fine-grained soils have less than 50% of their dry weight retained on a #200 sieve; they are defined as silts or clay depending on their Atterberg Limit attributes. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size.

DRILLING AND SAMPLING SYMBOLS

SFA: Solid Flight Auger - typically 4" diameter flights, except where noted.
HSA: Hollow Stem Auger - typically 3¼" or 4¼ I.D. openings, except where noted.
M.R.: Mud Rotary - Uses a rotary head with Bentonite or Polymer Slurry
R.C.: Diamond Bit Core Sampler
H.A.: Hand Auger
P.A.: Power Auger - Handheld motorized auger

SS: Split-Spoon - 1 3/8" I.D., 2" O.D., except where noted.
ST: Shelby Tube - 3" O.D., except where noted.
RC: Rock Core
TC: Texas Cone
BS: Bulk Sample
PM: Pressuremeter
CPT-U: Cone Penetrometer Testing with Pore-Pressure Readings

SOIL PROPERTY SYMBOLS

N: Standard "N" penetration: Blows per foot of a 140 pound hammer falling 30 inches on a 2-inch O.D. Split-Spoon.
N_{60} A "N" penetration value corrected to an equivalent 60% hammer energy transfer efficiency (ETR)
: Unconfined compressive strength, TSF
Q_u Pocket penetrometer value, unconfined compressive strength, TSF
: Moisture/water content, %
Q_p Liquid Limit, %
: Plastic Limit, %
w%: Plasticity Index = (LL-PL),%
LL: Dry unit weight, pcf
PL Apparent groundwater level at time noted
PI:
DD:
'–'

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Relative Density	N - Blows/foot
Very Loose	0 - 4
Loose	4 - 10
Medium Dense	10 - 30
Dense	30 - 50
Very Dense	50 - 80
Extremely Dense	80+

ANGULARITY OF COARSE-GRAINED PARTICLES

Description	Criteria
Angular:	Particles have sharp edges and relatively plane sides with unpolished surfaces
Subangular:	Particles are similar to angular description, but have rounded edges
Subrounded:	Particles have nearly plane sides, but have well-rounded corners and edges
Rounded:	Particles have smoothly curved sides and no edges

GRAIN-SIZE TERMINOLOGY

Component	Size Range
Boulders:	Over 300 mm (>12 in.)
Cobbles:	75 mm to 300 mm (3 in. to 12 in.)
Coarse-Grained Gravel:	19 mm to 75 mm (¾ in. to 3 in.)
Fine-Grained Gravel:	4.75 mm to 19 mm (No.4 to ¾ in.)
Coarse-Grained Sand:	2 mm to 4.75 mm (No.10 to No.4)
Medium-Grained Sand:	0.42 mm to 2 mm (No.40 to No.10)
Fine-Grained Sand:	0.075 mm to 0.42 mm (No. 200 to No.40)
Silt:	0.005 mm to 0.075 mm
Clay:	<0.005 mm

PARTICLE SHAPE

Description	Criteria
Flat:	Particles with width/thickness ratio > 3
Elongated:	Particles with length/width ratio > 3
Flat & Elongated:	Particles meet criteria for both flat and elongated

RELATIVE PROPORTIONS OF FINES

Descriptive Term	% Dry Weight
Trace:	
With:	
Mod	

ifier:

< 5%
5% to 12%
>12%

GENERAL NOTES

(Continued)

CONSISTENCY OF FINE-GRAINED SOILS

Q_U - TSF	N - Blows/foot	Consistency
0 - 0.25	0 - 2	Very Soft
0.25 - 0.50	2 - 4	Soft
0.50 - 1.00	4 - 8	Firm (Medium Stiff)
1.00 - 2.00	8 - 15	Stiff
2.00 - 4.00	15 - 30	Very Stiff
4.00 - 8.00	30 - 50	Hard
8.00+	50+	Very Hard

MOISTURE CONDITION DESCRIPTION

Description	Criteria
Dry:	Absence of moisture, dusty, dry to the touch
Moist:	Damp but no visible water
Wet:	Visible free water, usually soil is below water table

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term	% Dry Weight
Trace:	< 15%
With:	15% to 30%
Modifier:	>30%

STRUCTURE DESCRIPTION

Description	Criteria
Stratified:	Alternating layers of varying material or color with layers at least ¼-inch (6 mm) thick
Laminated:	Alternating layers of varying material or color with layers less than ¼-inch (6 mm) thick
Fissured:	Breaks along definite planes of fracture with little resistance to fracturing
Slickensided:	Fracture planes appear polished or glossy, sometimes striated
Blocky:	Cohesive soil that can be broken down into small angular lumps which resist further breakdown
Lensed:	Inclusion of small pockets of different soils
Layer:	Inclusion greater than 3 inches thick (75 mm)
Seam:	Inclusion 1/8-inch to 3 inches (3 to 75 mm) thick extending through the sample
Parting:	Inclusion less than 1/8-inch (3 mm) thick

SCALE OF RELATIVE ROCK HARDNESS

Q_U - TSF	Consistency
2.5 - 10	Extremely Soft
10 - 50	Very Soft
50 - 250	Soft
250 - 525	Medium Hard
525 - 1,050	Moderately Hard
1,050 - 2,600	Hard
>2,600	Very Hard

ROCK BEDDING THICKNESSES

Description	Criteria
Very Thick Bedded	Greater than 3-foot (>1.0 m)
Thick Bedded	1-foot to 3-foot (0.3 m to 1.0 m)
Medium Bedded	4-inch to 1-foot (0.1 m to 0.3 m)
Thin Bedded	1¼-inch to 4-inch (30 mm to 100 mm)
Very Thin Bedded	½-inch to 1¼-inch (10 mm to 30 mm)
Thickly Laminated	1/8-inch to ½-inch (3 mm to 10 mm)
Thinly Laminated	1/8-inch or less "paper thin" (<3 mm)

ROCK VOIDS

Voids	Void Diameter
Pit	<6 mm (<0.25 in)
Vug	6 mm to 50 mm (0.25 in to 2 in)
Cavity	50 mm to 600 mm (2 in to 24 in)
Cave	>600 mm (>24 in)

GRAIN-SIZED TERMINOLOGY

(Typically Sedimentary Rock)

Component	Size Range
Very Coarse Grained	>4.76 mm
Coarse Grained	2.0 mm - 4.76 mm
Medium Grained	0.42 mm - 2.0 mm
Fine Grained	0.075 mm - 0.42 mm
Very Fine Grained	<0.075 mm

ROCK QUALITY DESCRIPTION

Rock Mass Description	RQD Value
Excellent	90 -100
Good	75 - 90
Fair	50 - 75
Poor	25 -50
Very Poor	Less than 25

DEGREE OF WEATHERING

Slightly Weathered:	Rock generally fresh, joints stained and discoloration extends into rock up to 25 mm (1 in), open joints may contain clay, core rings under hammer impact.
Weathered:	Rock mass is decomposed 50% or less, significant portions of the rock show discoloration and weathering effects, cores cannot be broken by hand or scraped by knife.
Highly Weathered:	Rock mass is more than 50% decomposed, complete discoloration of rock fabric, core may be extremely broken and gives clunk sound when struck by hammer, may be shaved with a knife.

SOIL CLASSIFICATION CHART

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

SECTION 02 41 41 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Demolition and removal of selected portions of building or structure.
2. Demolition and removal of selected site elements.
3. Salvage of existing items to be reused or recycled.

1.3 DEFINITIONS

A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

1.4 MATERIALS OWNERSHIP

A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.5 PREINSTALLATION MEETINGS

A. Predemolition Conference:

1.6 INFORMATIONAL SUBMITTALS

A. Engineering Survey:

B. Proposed Protection Measures:

C. Schedule of Selective Demolition Activities:

D. Pre-demolition Photographs or Video:

1.7 CLOSEOUT SUBMITTALS

A. Inventory: Inventory: Submit a list of items that have been removed and salvaged.

1.8 FIELD CONDITIONS

A. Owner will occupy buildings immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.9 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties.

B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.10 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

B. Standards: Comply with ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that utilities have been disconnected and capped before starting selective demolition operations.

B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.

C. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.

1. Comply with requirements specified in Section 01 3233 "Photographic Documentation."

2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.

3. Before selective demolition or removal of existing elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.

2. Arrange to shut off utilities with utility companies.

3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.

3.3 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings, airplanes, equipment and facilities to remain.

1. Provide temporary weather protection, during interval between selective demolition of existing construction.

2. Comply with requirements for temporary enclosures, dust control as specified in Section 01 5000 "Temporary Facilities and Controls."

B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.

2. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

3. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Existing Items to Remain: Protect construction indicated to remain against damage

and soiling during selective demolition.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.

B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.

C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and recycle or dispose of them.

1. Do not allow demolished materials to accumulate on-site.

2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

B. Burning: Do not burn demolished materials.

3.7 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

B. Refer to Section 01 7423 “Final Cleaning” for additional cleaning requirements.

END OF SECTION 02 41 41

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SECTION 03 00 00 - STRUCTURAL SUMMARY OF WORK

PART 1 - GENERAL

1.1 PRIMARY CONSTRUCTION CODES AND STANDARDS

A. 2017 Florida Building Code, Building

B. ASCE 7-10

C. ACI 318-14

1.2 CONSTRUCTION CRITERIA

A. Live Loads (reduced as allowed by the Building Code):

1. GENERAL AREAS	100 psf
2. PUBLIC ROOMS	100 psf
3. CORRIDORS - FIRST FLOOR	100 psf
4. MECHANICAL ROOMS	150 psf
5. Partitions	15 psf
6. Roof	20 psf

B. Basic Wind Speed: 154 mph (3-Second Ultimate Gust)

1. Exposure: C
2. Risk Category: III

1.3 STRUCTURAL TESTING AND INSPECTION

A. This building is designated as a Threshold Building.

1.4 MATERIAL PROPERTIES

A. Reinforcement:

1. Reinforcing Steel	ASTM A615, Grade 60

B. Normal-Weight Concrete:

1. Footings	3,000 psi
2. Slab-on-Grade	3,000 psi

C. Structural Steel:

1. Structural steel W-shapes shall conform to ASTM A992, Grade 50.
2. Square /rectangular hollow structural sections (HSS) shall conform to ASTM A500 Grade B.
3. Round hollow structural sections (HSS) shall conform to ASTM A500, Grade B.
4. Other Steel shapes (channels, angles, and plates) may conform to ASTM A36.

1.5 GEOTECHNICAL REPORT

A. See 02 31 00: The geotechical report provided by Professional Service Industries Inc. (PSI), dated August 8, 2019 and Report Number 07832840 was used in the design of this building. Contractor shall follow the recommendations of this report for site preparation work.

1.6 FOUNDATIONS/SLAB-ON-GRADE

A. The foundations will consist of strip footings along the building perimeter to support the CMU bearing walls and individual spread footings at columns with a soil bearing capacity of 2,000 psf minimum as per the geotechnical report.

B. Column footings are indicated on plans and range from 3'-0" 3'-0" x 1'-0" thick to 8'-0" x 8'-0" x 1'-4" thick.

C. Wall footings are indicated on plans and range from 2'-0" x 1'-0" thick to 4'-0" x 1'-2" thick.

D. A soil-supported, 4-inch thick concrete slab, with WWF 6x6 - W4.0xW4.0 reinforcing is provided at the ground floor.

E. Slabs-on-grade shall be constructed on a 4-inch thick, free-draining granular subbase and 15 mil vapor barrier.

F. No retaining walls for the building structure are provided. Any retaining walls outside the building pad are not by TLC.

1.7 GRAVITY LOAD-RESISTING STRUCTURE

A. CMU bearing walls support steel joists and metal roof deck.

1.8 LATERAL LOAD-RESISTING STRUCTURE

A. CMU bearing walls will also act as shear walls, and additional CMU shear walls are provided to resist lateral loads.

1.9 MEZZANINE OR RAISED PLATFORMS

A. None.

1.10 ROOF STRUCTURE

A. 1-1/2-inch metal deck (galvanized, 20 gage).

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION 03 00 00

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SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

B. Related Requirements:

1. Section 312000 "Earth Moving" for drainage fill under slabs-on-grade.
2. Section 321313 "Concrete Paving" for concrete pavement and walks.
3. Section 321316 "Decorative Concrete Paving" for decorative concrete pavement and walks.

1.3 DEFINITIONS

A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; materials subject to compliance with requirements.

B. W/C Ratio: The ratio by weight of water to cementitious materials.

C. Preinstallation Conference: Conduct conference at the DESTIN-FORT WALTON BEACH AIRPORT (VPS).

1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:

a. Contractor's superintendent.

b. Independent testing agency responsible for concrete design mixtures.

c. Ready-mix concrete manufacturer.

d. Concrete Subcontractor.

2. Review special inspection and testing and inspecting agency procedures for field quality control, curing procedures, construction contraction and isolation joints, and joint-filler strips, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, and concrete protection.

1.4 ACTION SUBMITTALS

A. (SD-01) Product Data: For each type of product.

B. (SD-05) Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mixing water to be withheld for later addition at Project site.

C. (SD-04) Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

D. (SD-04) Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect.

E. (SD-15) Samples: For waterstops and vapor retarder.

1.5 INFORMATIONAL SUBMITTALS

A. (SD 13) Qualification Data: For installer, manufacturer and testing agency.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Form materials and form-release agents.
4. Steel reinforcement and accessories.
5. Fiber reinforcement.
6. Waterstops.
7. Curing compounds.
8. Floor and slab treatments.
9. Bonding agents.

10. Adhesives.
11. Vapor retarders.
12. Semirigid joint filler.
13. Joint-filler strips.
14. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency:

1. Aggregates: Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

D. Minutes of preinstallation conference.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI- certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician, Grade I. Testing agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician, Grade II.

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M.

1.7 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

1.9 FIELD CONDITIONS

A. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.

1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.

B. Hot-Weather Placement: Comply with ACI 301 and as follows:

1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:

1. ACI 301.
2. ACI 117.

2.2 FORM-FACING MATERIALS

A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.

1. Plywood, metal, or other approved panel materials.

B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

C. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.

D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.

E. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.

F. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

G. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.

1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.
3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

2.3 STEEL REINFORCEMENT

A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

B. Plain-Steel Wire: ASTM A 1064/A 1064M.

C. Deformed-Steel Wire: ASTM A 1064/A 1064M.

D. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.

E. Deformed-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, flat sheet.

F. Galvanized-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from galvanized-steel wire into flat sheets.

2.4 REINFORCEMENT ACCESSORIES

A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.

B. Epoxy-Coated Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, ASTM A 775/A 775M epoxy coated.

C. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775/A 775M.

D. Zinc Repair Material: ASTM A 780/A 780M.

E. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:

1. For concrete surfaces exposed to view, where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless- steel bar supports.

2.5 CONCRETE MATERIALS

A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.

B. Cementitious Materials:

1. Portland Cement: ASTM C 150/C 150M, Type I/II.
2. Fly Ash: ASTM C 618, Class F.
3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.
4. Silica Fume: ASTM C 1240, amorphous silica.

C. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.

1. Maximum Coarse-Aggregate Size: [1-1/2 inches] [1 inch] [3/4 inch] <Insert dimension> nominal.
2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

D. Lightweight Aggregate: ASTM C 330/C 330M, [1-inch] [3/4-inch] [1/2-inch] [3/8-inch] nominal maximum aggregate size.

E. Air-Entraining Admixture: ASTM C 260/C 260M.

F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

G. Water: ASTM C 94/C 94M and potable.

2.6 WATERSTOPS

A. Flexible Rubber Waterstops: CE CRD-C 513, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

B. Flexible PVC Waterstops: CE CRD-C 572,[with factory-installed metal eyelets,] for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

C. Self-Expanding Butyl Strip Waterstops: Manufactured rectangular or trapezoidal strip, butyl rubber with sodium bentonite or other hydrophilic polymers, for adhesive bonding to concrete, 3/4 by 1 inch.

D. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer-modified chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch.

2.7 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.

B. Sheet Vapor Retarder: ASTM E 1745, Class B. Include manufacturer's recommended adhesive or pressure-sensitive tape.

C. Sheet Vapor Retarder: ASTM E 1745, Class C. Include manufacturer's recommended adhesive or pressure-sensitive joint tape.

D. Bituminous Vapor Retarder: 110-mil- thick, semiflexible, seven-ply sheet membrane consisting of reinforced core and carrier sheet with fortified asphalt layers, protective

weathercoating, and removable plastic release liner. Furnish manufacturer's accessories, including bonding asphalt, pointing mastics, and self-adhering joint tape.

1. Water-Vapor Permeance: 0.0011 grains/h x sq. ft. x inches Hg; ASTM E 154.
2. Tensile Strength: 140 lbf/inch; ASTM E 154.
3. Puncture Resistance: 90 lbf; ASTM E 154.

2.8 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

D. Water: Potable.

E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

F. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

G. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.9 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 175, asphalt-saturated cellulosic fiberorASTM D 1752, cork or self-expanding cork.

B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, aromatic polyurea with a Type A shore durometer hardness range of 90 to 95 according to ASTM D 2240.

C. Bonding Agent: ASTM C 1059/C 1059M, Type II, nonredispersible, acrylic emulsion or styrene butadiene.

D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:

1. Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to

hardened concrete.

E. Reglets: Fabricate reglets of not less than 0.022-inch- thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.

F. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.10 REPAIR MATERIALS

A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than [4100 psi] <Insert strength> at 28 days when tested according to ASTM C 109/C 109M.

B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.

1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
4. Compressive Strength: Not less than [5000 psi] <Insert strength> at 28 days when tested according to ASTM C 109/C 109M.

2.11 CONCRETE MIXTURES, GENERAL

A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.

1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.
2. Combined Fly Ash and Pozzolan: 25 percent.
3. Slag Cement: 50 percent.
4. Combined Fly Ash or Pozzolan and Slag Cement: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
5. Silica Fume: 10 percent.
6. Combined Fly Ash, Pozzolans, and Silica Fume: 35 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.
7. Combined Fly Ash or Pozzolans, Slag Cement, and Silica Fume: 50 percent with fly ash or pozzolans not exceeding 25 percent and silica fume not exceeding 10 percent.

C. Limit water-soluble, chloride-ion content in hardened concrete to 1.00 percent by weight of cement.

D. Admixtures: Use admixtures according to manufacturer's written instructions.

1. Use water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a w/c ratio below 0.50.
4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

E. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.12 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings: Normal-weight concrete.

1. Minimum Compressive Strength: 3000 psi at 28 days.
2. Maximum W/C Ratio: 0.50.
3. Slump Limit: 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for [1-inch] [3/4-inch] nominal maximum aggregate size.

B. Slabs-on-Grade: Normal-weight concrete.

1. Minimum Compressive Strength: 3000 psi at 28 days.

2. Maximum W/C Ratio: 0.50.
3. Minimum Cementitious Materials Content: [470 lb/cu. yd.] [520 lb/cu. yd.] [540 lb/cu. yd.].
4. Slump Limit: 5 inches], plus or minus 1 inch.
5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for [1-inch] [3/4-inch] nominal maximum aggregate size.
6. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

C. Building Frame Members: Normal-weight concrete.

1. Minimum Compressive Strength: 4000 psi at 28 days.
2. Maximum W/C Ratio: 0.48.
3. Slump Limit: 8 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for [1-inch] [3/4-inch] nominal maximum aggregate size.

2.13 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.14 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.

1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd..
3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.

B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.

C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:

1. Class A, 1/8 inch for smooth-formed finished surfaces.
2. Class D, 1 inch for rough-formed finished surfaces.

D. Construct forms tight enough to prevent loss of concrete mortar.

E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
2. Do not use rust-stained steel form-facing material.

F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.

G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.

H. Chamfer exterior corners and edges of permanently exposed concrete.

I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.

L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEM INSTALLATION

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
3. Install dovetail anchor slots in concrete structures as indicated.

3.3 REMOVING AND REUSING FORMS

A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.

1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.

C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.4 VAPOR-RETARDER INSTALLATION

A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.

1. Lap joints 6 inches and seal with manufacturer's recommended tape.

B. Bituminous Vapor Retarders: Place, protect, and repair bituminous vapor retarder

according to manufacturer's written instructions.

3.5 STEEL REINFORCEMENT INSTALLATION

A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.

D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

E. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.6 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam- girder intersection.
4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
   1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

   1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
   2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Section 079200 "Joint Sealants," are indicated.
   3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

3.7 WATERSTOP INSTALLATION

A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.8 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.

B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.

   1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

C. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.

D. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
2. Maintain reinforcement in position on chairs during concrete placement.
3. Screed slab surfaces with a straightedge and strike off to correct elevations.
4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open- textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.9 FINISHING FORMED SURFACES

A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces not exposed to public view.

B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.

1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete.

C. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix 1 part portland cement to 1- 1/2 parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix 1 part portland cement and 1 part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches, so color of dry grout matches adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.

D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.10 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.

1. Apply scratch finish to surfacesto receive mortar setting beds for bonded cementitious floor finishes.

C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfacesto be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film- finish

coating system.

2. Finish surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:

   a. Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.
   b. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.

E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

3.11 MISCELLANEOUS CONCRETE ITEM INSTALLATION

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Equipment Bases and Foundations:

1. Coordinate sizes and locations of concrete bases with actual equipment provided.
2. Construct concrete bases 8 inches high unless otherwise indicated, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
3. Minimum Compressive Strength: 3000 psi at 28 days.
4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
5. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete substrate.
6. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
7. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.12 CONCRETE PROTECTING AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.

B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.

C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:

1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

   a. Water.
   b. Continuous water-fog spray.
   c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture- retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.

   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
   b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
   c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies does not interfere with bonding of floor covering used on Project.

3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

   a. Removal: After curing period has elapsed, remove curing compound without

damaging concrete surfaces by method recommended by curing compound manufacturer unless manufacturer certifies curing compound does not interfere with bonding of floor covering used on Project.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.13 LIQUID FLOOR TREATMENT APPLICATION

A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.

1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
2. Do not apply to concrete that is less than three days' old.
3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

3.14 JOINT FILLING

A. Prepare, clean, and install joint filler according to manufacturer's written instructions.

1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.

B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.

C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.

1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.

D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4- inch clearance all around. Dampen concrete surfaces in contact with patching concrete

and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete, except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.16 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.

C. Inspections:

1. Steel reinforcement placement.
2. Headed bolts and studs.
3. Verification of use of required design mixture.
4. Concrete placement, including conveying and depositing.
5. Curing procedures and maintenance of curing temperature.

D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:

1. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. or fraction thereof of each concrete mixture placed each day.

   a. When frequency of testing provides fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.

2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
3. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete;

one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.

4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.

5. Compression Test Specimens: ASTM C 31/C 31M.

    a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.

6. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.

    a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
    b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.

7. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
9. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28- day tests.
10. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
11. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
12. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
13. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

E. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

3.17 PROTECTION OF LIQUID FLOOR TREATMENTS

A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

END OF SECTION 03 30 00

SECTION 04 22 00 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Concrete masonry units.
2. Decorative concrete masonry units.
3. Pre-faced concrete masonry units.
4. Mortar and grout.
5. Steel reinforcing bars.
6. Masonry-joint reinforcement.
7. Embedded flashing.
8. Miscellaneous masonry accessories.
9. Masonry-cell fill.

B. Products Installed but not Furnished under This Section:

1. Cast-stone trim in concrete unit masonry.

C. Related Requirements:

1. Section 03 30 00 "Cast-in-Place Concrete" for installing dovetail slots for masonry anchors.
2. Section 05 12 00 "Structural Steel Framing" for installing anchor sections of adjustable masonry anchors for connecting to structural steel frame.
3. Section 07 19 00 "Water Repellents" for water repellents applied to unit masonry assemblies.
4. Section 07 62 00 "Sheet Metal Flashing and Trim" for sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.

1.3 DEFINITIONS

A. CMU(s): Concrete masonry unit(s).

B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.5 ACTION SUBMITTALS

A. (SD-01) Product Data: For each type of product.

B. (SD-04) Shop Drawings: For the following:

1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
2. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315. Show elevations of reinforced walls.
3. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

C. (SD-16) Samples for Initial Selection:

1. Decorative CMUs, in the form of small-scale units.
2. Pre-faced CMUs.
3. Colored mortar.
4. Weep holes/vents.

D. (SD-15) Samples for Verification: For each type and color of the following:

1. Exposed and decorative CMUs.
2. Pre-faced CMUs.

1.6 INFORMATIONAL SUBMITTALS

A. (SD-13) Qualification Data: For testing agency.

B. (SD-13) Material Certificates: For each type and size of the following:

1. Masonry units.

a. Include data on material properties and material test reports substantiating compliance with requirements.

b. For masonry units, include data and calculations establishing average net-area compressive strength of units.

2. Integral water repellant used in CMUs.

3. Cementitious materials. Include name of manufacturer, brand name, and type.

4. Mortar admixtures.

5. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.

6. Grout mixes. Include description of type and proportions of ingredients.

7. Reinforcing bars.

8. Joint reinforcement.

9. Anchors, ties, and metal accessories.

C. (SD-05) Mix Designs: For each type of mortar. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.

2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.

E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.

B. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.

1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 48 inches long by 48 inches high by full thickness.
2. Build sample panels facing south.
3. Where masonry is to match existing, build panels adjacent and parallel to existing surface.
4. Protect approved sample panels from the elements with weather-resistant membrane.
5. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.

a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless Architect specifically approves such deviations in writing.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when

construction is not in progress.

1. Extend cover a minimum of 24 inches (600 mm) down both sides of walls, and hold cover securely in place.

B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.

C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.

B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.2 PERFORMANCE REQUIREMENTS

A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.

1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.
2. Determine net-area compressive strength of masonry by testing masonry prisms according to ASTM C 1314.

2.3 UNIT MASONRY, GENERAL

A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6 except as modified by requirements in the Contract Documents.

B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.

1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.4 CONCRETE MASONRY UNITS

A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
2. Provide bull nose units for outside corners unless otherwise indicated.

B. CMUs: ASTM C 90.

1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength as indicated on plan.
2. Density Classification: Normal weight.

3. Size (Width): Manufactured to dimensions 3/8 inch less-than-nominal dimensions.

4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.

5. Faces to Receive Plaster: Where units are indicated to receive a direct application of plaster, provide textured-face units made with gap-graded aggregates.

2.5 CONCRETE AND MASONRY LINTELS

A. General: Provide one of the following:

B. Concrete Lintels: Precast or formed-in-place concrete lintels complying with requirements in Section 033000 "Cast-in-Place Concrete," and with reinforcing bars indicated. See schedule on drawings.

C. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs matching adjacent CMUs in color, texture, and density classification, with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

D. Refer to architectural drawings and specifications for aesthetic requirements of exposed masonry lintels.

2.6 BURNISHED CMU

A. Manufacturers:

1. Basis of design: Westbrook Block Company, 860-399-6201
2. Arrowhead Concrete Work, Inc. 218-729-8274
3. Oneonta Block Company 607-432-6641
4. Cemex
5. Old Castle
6. Preferred Material

B. Description:

1. Integrally pigmented loadbearing hollow units with a net area compressive strength of greater or equal to 2000 P.S.I.
2. Compliance with ASTM C 90
3. Coloring: Integral, through-body coloring; synthetic or natural iron oxide pigments. Color to be selected by Architect from full range of standard colors.
4. Finish: Ground Face all three sides or as indicated on drawings.
5. Size and Shape: Based from the “National Concrete Masonry Association Concrete

Masonry Shapes and Sizes Manual 1997 edition.
00 GRF 040816-Stretcher
00 GRF 040816-Corner
00 GRF 040816-Return Corner
00 GRF 040808-Stretcher
00 GRF 040808-Corner
00 GRF 080816-Strecher
00 GRF 080816-Corner
00 GRF 080808-Strecher

6. Style: Hollow

7. Color: To be selected by Architect

2.7 MORTAR AND GROUT MATERIALS

A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.

1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Masonry Cement: ASTM C 91/C 91M.

E. Mortar Cement: ASTM C 1329/C 1329M.

F. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

G. Aggregate for Grout: ASTM C 404.

H. Epoxy Pointing Mortar: ASTM C 395, epoxy-resin-based material formulated for use as pointing mortar for glazed or pre-faced masonry units (and approved for such use by

manufacturer of units); in color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's colors.

I. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.

J. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs containing integral water repellent from same manufacturer.

K. Water: Potable.

2.8 REINFORCEMENT

A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).

B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.

C. Masonry-Joint Reinforcement, General: Ladder type complying with ASTM A 951/A 951M.

1. Interior Walls: Mill- galvanized carbon steel.
2. Exterior Walls: Stainless steel.
3. Wire Size for Side Rods: [0.187-inch (4.76-mm)] diameter.
4. Wire Size for Cross Rods: [0.187-inch (4.76-mm)] diameter.
5. Spacing of Cross Rods: Not more than 16 inches (407 mm) o.c.
6. Provide in lengths of not less than 10 feet (3 m).

2.9 TIES AND ANCHORS

A. General: Ties and anchors shall extend at least 1-1/2 inches (38 mm) into masonry but with at least a 5/8-inch (16-mm) cover on outside face.

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Mill-Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 641/A 641M, Class 1 coating.
2. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 153/A 153M, Class B-2 coating.
3. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304.

4. Galvanized-Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 (Z180) zinc coating.
5. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
6. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304.
7. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

C. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- (6.35-mm-) diameter, stainless-steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.
2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- (4.76-mm-) diameter, stainless-steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.

D. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.060-inch- (1.52-mm-) thick steel sheet, galvanized after fabrication.

   a. 0.064-inch- (1.63-mm-) thick, galvanized-steel sheet may be used at interior walls unless otherwise indicated.

2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- (4.76-mm-) diameter, stainless-steel wire. Mill-galvanized wire may be used at interior walls unless otherwise indicated.
3. Corrugated-Metal Ties: Metal strips not less than 7/8 inch (22 mm) wide with corrugations having a wavelength of 0.3 to 0.5 inch (7.6 to 12.7 mm) and an amplitude of 0.06 to 0.10 inch (1.5 to 2.5 mm) made from 0.060-inch- (1.52-mm-) thick steel sheet, galvanized after fabrication with dovetail tabs for inserting into dovetail slots in concrete.

   a. 0.064-inch- (1.63-mm-) thick, galvanized sheet may be used at interior walls unless otherwise indicated.

E. Partition Top Anchors: 0.105-inch- (2.66-mm-) thick metal plate with a 3/8-inch- (9.5-mm-) diameter metal rod 6 inches (152 mm) long welded to plate and with closed-end plastic tube fitted over rod that allows rod to move in and out of tube. Fabricate from stainless

steel.

F. Rigid Anchors: Fabricate from steel bars 1-1/2 inches (38 mm) wide by 1/4 inch (6.35 mm) thick by 24 inches (610 mm) long, with ends turned up 2 inches (51 mm) or with cross pins unless otherwise indicated.

1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

2.10 EMBEDDED FLASHING MATERIALS

A. Metal Flashing: Provide metal flashing complying with Section 076200 "Sheet Metal Flashing and Trim" and as follows:

1. Stainless Steel: ASTM A 240/A 240M or ASTM A 666, Type 304, 0.016 inch (0.40 mm) thick.
2. Copper: ASTM B 370, Temper H00, cold-rolled copper sheet, 16-oz./sq. ft. (4.9-kg/sq.
m) weight or 0.0216 inch (0.55 mm) thick or ASTM B 370, Temper H01, high-yield copper sheet, 12-oz./sq. ft. (3.7-kg/sq. m) weight or 0.0162 inch (0.41 mm) thick.
3. Fabricate continuous flashings in sections 96 inches (2400 mm) long minimum, but not exceeding 12 feet (3.7 m). Provide splice plates at joints of formed, smooth metal flashing.
4. Fabricate through-wall metal flashing embedded in masonry from stainless steel, with ribs at 3-inch (76-mm) intervals along length of flashing to provide an integral mortar bond.
5. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
6. Fabricate through-wall flashing with drip edge unless otherwise indicated. Fabricate by extending flashing 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees.
7. Fabricate through-wall flashing with sealant stop unless otherwise indicated. Fabricate by bending metal back on itself 3/4 inch (19 mm) at exterior face of wall and down into joint 1/4 inch (6 mm) to form a stop for retaining sealant backer rod.
8. Fabricate metal drip edges and sealant stops for ribbed metal flashing from plain metal flashing of same metal as ribbed flashing and extending at least 3 inches (76 mm) into wall with hemmed inner edge to receive ribbed flashing and form a hooked seam. Form hem on upper surface of metal so that completed seam sheds water.
9. Fabricate metal drip edges from stainless steel. Extend at least 3 inches (76 mm) into wall and 1/2 inch (13 mm) out from wall, with outer edge bent down 30 degrees.
10. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches (76 mm) into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch (19 mm) and down into joint 1/4 inch (6 mm) to form a stop for

retaining sealant backer rod.

11. Fabricate metal expansion-joint strips from stainless steel to shapes indicated.

12. Solder metal items at corners.

B. Flexible Flashing: Use one of the following unless otherwise indicated:

1. Copper-Laminated Flashing: 7-oz./sq. ft. (2-kg/sq. m) copper sheet bonded between two layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.

2. Asphalt-Coated Copper Flashing: 7-oz./sq. ft. (2-kg/sq. m) copper sheet coated with flexible asphalt. Use only where flashing is fully concealed in masonry.

3. Rubberized-Asphalt Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch (1.02 mm).

   a. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

4. Butyl Rubber Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.040 inch (1.02 mm).

   a. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

5. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a polyester-reinforced ethylene interpolymer alloy.

   a. Monolithic Sheet: Elastomeric thermoplastic flashing, 0.040 inch (1.02 mm) thick.

   b. Self-Adhesive Sheet: Elastomeric thermoplastic flashing, 0.025 inch (0.64 mm) thick, with a 0.015-inch- (0.38-mm-) thick coating of adhesive.

   c. Self-Adhesive Sheet with Drip Edge: Elastomeric thermoplastic flashing, 0.025 inch (0.64 mm) thick, with a 0.015-inch- (0.38-mm-) thick coating of rubberized-asphalt adhesive. Where flashing extends to face of masonry, rubberized-asphalt coating is held back approximately 1-1/2 inches (38 mm) from edge.

      1) Color: Gray.

   d. Accessories: Provide preformed corners, end dams, other special shapes, and seaming materials produced by flashing manufacturer.

6. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D 4637/D 4637M, 0.040 inch (1.02 mm)

thick.

C. Application: Unless otherwise indicated, use the following:

1. Where flashing is indicated to receive counterflashing, use metal flashing.
2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing with a drip edge.
4. Where flashing is fully concealed, use metal flashing or flexible flashing.

D. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from UV-resistant, high-density polyethylene. Cell flashing pans have integral weep spouts designed to be built into mortar bed joints and that extend into the cell to prevent clogging with mortar.

E. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."

1. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
2. Solder for Copper: ASTM B 32, Grade Sn50.
3. Elastomeric Sealant: ASTM C 920, chemically curing urethane sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and remain watertight.

F. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.11 MISCELLANEOUS MASONRY ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.12 MASONRY-CELL FILL

A. Loose-Fill Insulation: Perlite complying with ASTM C 549, Type II (surface treated for water repellency and limited moisture absorption) or Type IV (surface treated for water repellency and to limit dust generation).

B. Lightweight-Aggregate Fill: ASTM C 331/C 331M.

2.13 MORTAR AND GROUT MIXES

A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.

1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime mortar unless otherwise indicated.
3. For exterior masonry, use portland cement-lime mortar.
4. For reinforced masonry, use portland cement-lime mortar.
5. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.

B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.

C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.

1. For masonry below grade or in contact with earth, use Type M.
2. For reinforced masonry, use Type S.
3. For mortar parge coats, use Type S.
4. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.
5. For interior nonload-bearing partitions, Type O may be used instead of Type N.

D. Grout for Unit Masonry: Comply with ASTM C 476.

1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.

2. Proportion grout in accordance with ASTM C 476, Table 1.
3. Provide grout with a slump of 8 to 11 inches (200 to 280 mm) as measured according to ASTM C 143/C 143M.

E. Epoxy Pointing Mortar: Mix epoxy pointing mortar to comply with mortar manufacturer's written instructions.

1. Application: Use epoxy pointing mortar for exposed mortar joints with pre-faced CMUs.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
2. Verify that foundations are within tolerances specified.
3. Verify that reinforcing dowels are properly placed.
4. Verify that substrates are free of substances that would impair mortar bond.

B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Build chases and recesses to accommodate items specified in this and other Sections.

B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.

C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm).

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.4 LAYING MASONRY WALLS

A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches (50 mm). Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.

H. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

I. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.

1. Install compressible filler in joint between top of partition and underside of structure above.
2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch (13-mm) clearance between end of anchor rod and end of tube. Space anchors 48 inches (1200 mm) o.c. unless otherwise indicated.
3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
4. At fire-rated partitions, treat joint between top of partition and underside of structure

above to comply with Section 078443 "Joint Firestopping."

3.5 MORTAR BEDDING AND JOINTING

A. Lay hollow CMUs as follows:

1. Bed face shells in mortar and make head joints of depth equal to bed joints.
2. Bed webs in mortar in all courses of piers, columns, and pilasters.
3. Bed webs in mortar in grouted masonry, including starting course on footings.
4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.

B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Wet joint surfaces thoroughly before applying mortar.
3. Rake out mortar joints for pointing with sealant.

D. Rake out mortar joints at pre-faced CMUs to a uniform depth of 1/4 inch (6 mm) and point with epoxy mortar to comply with epoxy-mortar manufacturer's written instructions.

E. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

F. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

G. Cut joints flush where indicated to receive waterproofing unless otherwise indicated.

H. Install molded-polystyrene insulation units into masonry unit cells before laying units.

3.6 MASONRY-JOINT REINFORCEMENT

A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).

1. Space reinforcement not more than 16 inches (406 mm) o.c.
2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.

C. Provide continuity at wall intersections by using prefabricated T-shaped units.

D. Provide continuity at corners by using prefabricated L-shaped units.

E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:

1. Provide an open space not less than 1/2 inch (13 mm) wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
3. Space anchors as indicated, but not more than 24 inches (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.

3.8 CONTROL AND EXPANSION JOINTS

A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.

B. Form control joints in concrete masonry using one of the following methods:

1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
2. Install preformed control-joint gaskets designed to fit standard sash block.
3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.

4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.

3.9 LINTELS

A. Provide concrete or masonry lintels where shown and where openings of more than 12 inches (305 mm) for brick-size units and 24 inches (610 mm) for block-size units are shown without structural steel or other supporting lintels.

B. Provide minimum bearing of 8 inches (200 mm) at each jamb unless otherwise indicated.

3.10 FLASHING

A. General: Install embedded flashing at ledges and other obstructions to downward flow of water in wall where indicated.

B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.

2. At lintels, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.

3. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches (38 mm) or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.

4. Install metal drip edges and sealant stops with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant complying with requirements in Section 079200 "Joint Sealants" for application indicated.

5. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal drip edge.

6. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.

7. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.

C. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

D. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

3.11 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.

1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them during construction.

B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.

C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
2. Limit height of vertical grout pours to not more than 60 inches (1520 mm).

3.12 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
2. Place grout only after inspectors have verified compliance of grout spaces and of

grades, sizes, and locations of reinforcement.

3. Place grout only after inspectors have verified proportions of site-prepared grout.

C. Testing Prior to Construction: One set of tests.

D. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.

E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.

G. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for mortar air content and compressive strength.

H. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

I. Prism Test: For each type of construction provided, according to ASTM C 1314 at 7 days and at 28 days.

3.13 PARGING

A. Parge exterior faces of below-grade masonry walls, where indicated, in two uniform coats to a total thickness of 3/4 inch (19 mm). Dampen wall before applying first coat, and scarify first coat to ensure full bond to subsequent coat.

B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of 1/8 inch per foot (3 mm per 300 mm). Form a wash at top of parging and a cove at bottom.

C. Damp-cure parging for at least 24 hours and protect parging until cured.

3.14 REPAIRING, POINTING, AND CLEANING

A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.

D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:

1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

3.15 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

B. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.

1. Crush masonry waste to less than 4 inches (100 mm) in each dimension.
2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
3. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.

C. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.

D. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04 22 00

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SECTION 05 12 00 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Structural steel.
2. Prefabricated building columns.
3. Field-installed shear connectors.
4. Grout.

B. Related Requirements:

1. Section 05 31 00 "Steel Decking" for field installation of shear connectors through deck.
2. Section 05 50 00 "Metal Fabrications" for miscellaneous steel fabrications and other steel items not defined as structural steel.
3. Section 09 91 00 " Painting" for surface-preparation and priming requirements.

1.3 DEFINITIONS

A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.

C. Heavy Sections: Rolled and built-up sections as follows:

1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches.
2. Welded built-up members with plates thicker than 2 inches.

3. Column base plates thicker than 2 inches.

D. Protected Zone: Structural members or portions of structural members indicated as "Protected Zone" on Drawings. Connections of structural and nonstructural elements to protected zones are limited.

E. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" or "Seismic Critical" on Drawings.

1.4 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. (SD-01) Product Data: For each type of product.

B. (SD-04) Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment Drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical, high-strength bolted connections.
5. Identify members and connections of the Seismic-Load-Resisting System.
6. Indicate locations and dimensions of protected zones.
7. Identify demand critical welds.

C. (SD-13) Welding Procedure Specifications (WPSs) and Procedure Qualification Records

(PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:

1. Power source (constant current or constant voltage).
2. Electrode manufacturer and trade name, for demand critical welds.

D. (SD-05) Delegated-Design Submittal: For structural-steel connections indicated to comply with design loads, include analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer, fabricator, and testing agency.

B. Welding certificates.

C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

D. Mill test reports for structural steel, including chemical and physical properties.

E. Product Test Reports: For the following:

1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
2. Direct-tension indicators.
3. Tension-control, high-strength, bolt-nut-washer assemblies.
4. Shear stud connectors.
5. Shop primers.
6. Nonshrink grout.

F. Survey of existing conditions.

G. Source quality-control reports.

H. Field quality-control and threshold inspection reports.

1.8 QUALITY ASSURANCE

A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE.

C. Shop-Painting Applicators: Qualified according to AISC's Sophisticated Paint Endorsement P1, Endorsement P2, Endorsement P3, or to SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."

D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8/D1.8M. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

E. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 360.
4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

1.9 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Connections: Provide details of connections required by the Contract Documents to be selected or completed by structural-steel fabricator, including comprehensive engineering analysis by a qualified professional engineer, to withstand loads indicated and comply with other information and restrictions indicated.

1. Select and complete connections using schematic details indicated and AISC 360.
2. Use Load and Resistance Factor Design; data is given as specified on the contract documents.

B. Moment Connections: Type FR, fully restrained.

C. Construction: Combined system of moment frame and shear walls.

2.2 STRUCTURAL-STEEL MATERIALS

A. W-Shapes: ASTM A 992/A 992M.

B. Channels, Angles:ASTM A 36/A 36M.

C. Plate and Bar: ASTM A 36/A 36M.

D. Corrosion-Resisting Structural-Steel Shapes, Plates, and Bars: ASTM A 588/A 588M, Grade 50.

E. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing.

F. Corrosion-Resisting, Cold-Formed Hollow Structural Sections: ASTM A 847/A 847M, structural tubing.

G. Steel Castings: ASTM A 216/A 216M, Grade WCB with supplementary requirement S11.

H. Steel Forgings: ASTM A 668/A 668M.

I. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS, CONNECTORS, AND ANCHORS

A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; with plain finish.

1. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with plain finish.

B. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts

1. Finish: Hot-dip zinc coating.
2. Direct-Tension Indicators: ASTM F 959, Type 325, compressible-washer type with mechanically deposited zinc coating finish.

C. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.

D. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.

1. Nuts: ASTM A 563 heavy-hex carbon steel.
2. Plate Washers: ASTM A 36/A 36M carbon steel.
3. Washers: ASTM F 436, Type 1, hardened carbon steel.
4. Finish: Plain.

E. Threaded Rods: ASTM A 36/A 36M.

1. Nuts: ASTM A 563 heavy-hex carbon steel.
2. Washers: ASTM F 436, Type 1, hardened carbon steel.
3. Finish: Plain.

F. Clevises and Turnbuckles: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1035.

G. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.

H. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

2.4 PRIMER

A. Primer: Comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

B. Primer: SSPC-Paint 23, latex primer.

C. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

D. Galvanizing Repair Paint: SSPC-Paint 20, ASTM A 780/A 780M.

2.5 GROUT

A. Metallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.

B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.

1. Camber structural-steel members where indicated.
2. Fabricate beams with rolling camber up.
3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
4. Mark and match-mark materials for field assembly.
5. Complete structural-steel assemblies, including welding of units, before starting shop- priming operations.

B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.

1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1

C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC- SP 1.

F. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

G. Steel Wall-Opening Framing: Select true and straight members for fabricating steel wall-opening framing to be attached to structural-steel frame. Straighten as required to provide uniform, square, and true members in completed wall framing. Build up welded framing, weld exposed joints continuously, and grind smooth.

H. Welded Door Frames: Build up welded door frames attached to structural-steel frame.

Weld exposed joints continuously and grind smooth. Plug-weld fixed steel bar stops to frames. Secure removable stops to frames with countersunk machine screws, uniformly spaced not more than 10 inches o.c. unless otherwise indicated.

I. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

2.7 SHOP CONNECTIONS

A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Snug tightened.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.8 SHOP PRIMING

A. Shop prime steel surfaces except the following:

1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
2. Surfaces to be field welded.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces.
6. Surfaces enclosed in interior construction.

B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications

and standards:

1. SSPC-SP 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
5. SSPC-SP 14/NACE No. 8, "Industrial Blast Cleaning."
6. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
7. SSPC-SP 10/NACE No. 2, "Near-White Blast Cleaning."
8. SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning."
9. SSPC-SP 8, "Pickling."

C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

D. Painting: Prepare steel and apply a one-coat, nonasphaltic primer complying with SSPC-PS Guide 7.00, "Painting System Guide 7.00: Guide for Selecting One-Coat Shop Painting Systems," to provide a dry film thickness of not less than 1.5 mils.

2.9 GALVANIZING

A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.

1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.

2. Galvanize lintels, shelf angles attached to structural-steel frame and located in exterior walls.

2.10 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.

1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Bolted Connections: Inspect and test shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:

1. Liquid Penetrant Inspection: ASTM E 165.
2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
3. Ultrasonic Inspection: ASTM E 164.
4. Radiographic Inspection: ASTM E 94.

D. In addition to visual inspection, test and inspect shop-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

E. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of existing conditions. Include bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

1. Do not remove temporary shoring supporting composite deck construction until cast-in- place concrete has attained its design compressive strength.

3.3 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

B. Baseplates Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials and roughen surfaces prior to setting plates. Clean bottom surface of plates.

1. Set plates for structural members on wedges, shims, or setting nuts as required.
2. Weld plate washers to top of baseplate.
3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that are in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.

1. Level and plumb individual members of structure.

2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

E. Splice members only where indicated.

F. Do not use thermal cutting during erection.

G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that

must be enlarged to admit bolts.

H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

3.4 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.

1. Joint Type: Pretensioned.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
2. Remove backing bars or runoff tabs where exposed to view, back gouge, and grind steel smooth.
3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

3.5 PREFABRICATED BUILDING COLUMNS

A. Install prefabricated building columns to comply with AISC 360, manufacturer's written recommendations, and requirements of testing and inspecting agency that apply to the fire-resistance rating indicated.

3.6 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:

1. Verify structural-steel materials and inspect steel frame joint details.
2. Verify weld materials and inspect welds.
3. Verify connection materials and inspect high-strength bolted connections.

B. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

C. Bolted Connections: Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."

D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.

1. In addition to visual inspection, test and inspect field welds according to AWS D1.1

a. Liquid Penetrant Inspection: ASTM E 165.

b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.

c. Ultrasonic Inspection: ASTM E 164.

d. Radiographic Inspection: ASTM E 94.

E. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.

2. Conduct tests according to requirements in AWS D1.1/D1.1M on additional shear connectors if weld fracture occurs on shear connectors already tested.

3.7 REPAIRS AND PROTECTION

A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.

B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC- PA 1 for touching up shop-painted surfaces.

1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

D. Touchup Priming: Cleaning and touchup priming are specified in Section 099600 "High-Performance Coatings."

END OF SECTION 05 12 00

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SECTION 05 21 00 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. K-series steel joists.
2. KCS-type K-series steel joists.
3. K-series steel joist substitutes.
4. LH-series long-span steel joists.
5. Joist accessories.

B. Related Requirements:

1. Section 03 30 00 "Cast-in-Place Concrete" for installing bearing plates in concrete.
2. Section 04 22 00 "Concrete Unit Masonry" for installing bearing plates in unit masonry.
3. Section 05 12 00 "Structural Steel Framing" for field-welded shear connectors.

1.3 DEFINITIONS

A. SJI's "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."

B. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support nonuniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

1.4 ACTION SUBMITTALS

A. Product Data: For each type of joist, accessory, and product.

B. Shop Drawings:

1. Include layout, designation, number, type, location, and spacing of joists.
2. Include joining and anchorage details; bracing, bridging, and joist accessories; splice and connection locations and details; and attachments to other construction.
3. Indicate locations and details of bearing plates to be embedded in other construction.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For manufacturer.

B. Welding certificates.

C. Manufacturer certificates.

D. Mill Certificates: For each type of bolt.

E. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer responsible for its preparation.

F. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications.”

1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.

B. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle joists as recommended in SJI's "Specifications."

B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

1.8 SEQUENCING

A. Deliver steel bearing plates to be built into cast-in-place concrete and masonry construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Vulcraft; Nucor Vulcraft Group

B. New Millennium Building Systems, LLC

C. Canam Steel Corporation; Canam Group, Inc.

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Provide special joists and connections capable of withstanding design loads indicated.

1. Use ASD; data are given at service-load level.
2. Design special joists to withstand design loads with live-load deflections no greater than the following:
   a. Roof Joists: Vertical deflection of 1/240 of the span.

2.3 K-SERIES STEEL JOISTS

A. Manufacture steel joists of type indicated according to "Standard Specification for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.

1. Joist Type: K-series steel joists and KCS-type K-series steel joists.

B. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.

C. Provide holes in chord members for connecting and securing other construction to joists.

D. Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated, complying with SJI's "Specifications."

E. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."

F. Do not camber joists.

G. Camber joists according to SJI's "Specifications," and as indicated in contract documents.

H. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

2.4 LONG-SPAN STEEL JOISTS

A. Manufacture steel joists according to "Standard Specification for Longspan Steel Joists, LH-Series in SJI's "Specifications," with steel-angle top- and bottom-chord members; of joist type and end and top-chord arrangements as indicated.

1. Joist Type: LH-series steel joists.
2. Top-Chord Arrangement: Parallel, unless noted otherwise.

B. Provide holes in chord members for connecting and securing other construction to joists.

C. Camber long-span steel joists according to SJI's "Specifications," or as indicated.

D. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

2.5 PRIMERS

A. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

B. Primer: Provide shop primer that complies with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

2.6 JOIST ACCESSORIES

A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.

B. Bridging: Schematically indicated. Detail and fabricate according to SJI's "Specifications." Furnish additional erection bridging if required for stability.

C. Fabricate steel bearing plates from ASTM A 36/A 36M steel with integral anchorages of sizes and thicknesses indicated. Shop prime paint.

D. Steel bearing plates with integral anchorages are specified in Section 055000 "Metal Fabrications."

E. Furnish ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch (13 mm) of finished wall surface unless otherwise indicated.

1. Finish: Plain, uncoated.

F. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.

1. Finish: Plain.

G. Welding Electrodes: Comply with AWS standards.

H. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20 ASTM A 780/A 780M.

I. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

2.7 CLEANING AND SHOP PAINTING

A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2.

B. Do not prime paint joists and accessories to receive sprayed fire-resistive materials.

C. Apply one coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.

D. Shop priming of joists and joist accessories is specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Do not install joists until supporting construction is in place and secured.

B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written instructions, and requirements in this Section.

1. Before installation, splice joists delivered to Project site in more than one piece.
2. Space, adjust, and align joists accurately in location before permanently fastening.
3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
4. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads are applied.

C. Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

D. Bolt joists to supporting steel framework using carbon-steel bolts.

E. Bolt joists to supporting steel framework using high-strength structural bolts. Comply with RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.

F. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Visually inspect field welds according to AWS D1.1/D1.1M.

1. In addition to visual inspection, test field welds according to AWS D1.1/D1.1M and the following procedures, at testing agency's option:

a. Liquid Penetrant Inspection: ASTM E 165/E 165M.
b. Magnetic Particle Inspection: ASTM E 709.
c. Ultrasonic Testing: ASTM E 164.
d. Radiographic Testing: ASTM E 94.

C. Visually inspect bolted connections.

D. Prepare test and inspection reports.

3.4 PROTECTION

A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists, bearing plates, abutting structural steel, and accessories.

1. Clean and prepare surfaces by hand-tool cleaning according to SSPC-SP 2 or power-tool cleaning according to SSPC-SP 3.

2. Apply a compatible primer of same type as primer used on adjacent surfaces.

C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

END OF SECTION 05 21 00

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SECTION 05 31 00 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Roof deck.
2. Cellular roof deck.
3. Acoustical roof deck.
4. Acoustical cellular roof deck.

B. Related Requirements:

1. Section 03 30 00 "Cast-in-Place Concrete" for normal-weight and lightweight structural concrete fill over steel deck.
2. Section 05 12 00 "Structural Steel Framing" for shop- and field-welded shear connectors.
3. Section 05 50 00 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
4. Section 09 91 00 "Painting" for repair painting of primed deck and finish painting of deck.

1.3 ACTION SUBMITTALS

A. (SD-01) Product Data: For each type of deck, accessory, and product indicated.

B. (SD-04) Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

A. (SD-13) Welding certificates.

B. (SD-13) Product Certificates: For each type of steel deck.

C. (SD-13) Product Test Reports: For tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

1. Power-actuated mechanical fasteners.
2. Acoustical roof deck.

D. (SD-10) Evaluation Reports: For steel deck, from ICC-ES.

E. (SD-12) Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.

B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."

C. Electrical Raceway Units: Provide UL-labeled cellular floor-deck units complying with UL 209 and listed in UL's "Electrical Construction Equipment Directory" for use with standard header ducts and outlets for electrical distribution systems.

D. FM Global Listing: Provide steel roof deck evaluated by FM Global and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.

B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 ROOF DECK

A. Manufacturers:

1. Epic Metals Corporation
2. New Millennium Building System
3. Nucor Corp

B. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:

1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), G90 zinc coating.
2. Deck Profile: Type WR, wide rib for building; dove-tail for canopy
3. Profile Depth: As indicated.
4. Design Uncoated-Steel Thickness: As indicated.
5. Span Condition: Triple span or more at building, single-span for canopy.
6. Side Laps: Overlapped.

2.3 ACCESSORIES

A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.

C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter. See drawings for sizes.

D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.

E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

F. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.

G. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0747 inch thick, with factory-punched hole of 3/8-inch minimum diameter.

H. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. For drains, cut holes in the field.

I. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3-inch-wide flanges and level recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.

J. Galvanizing Repair Paint: ASTM A 780/A 780M.

K. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

B. Install temporary shoring before placing deck panels if required to meet deflection limitations.

C. Locate deck bundles to prevent overloading of supporting members.

D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.

E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.

F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.

G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.

H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

3.3 ROOF-DECK INSTALLATION

A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long.

B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals as indicated.

C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:

1. End Joints: Lapped 2 inches minimum or butted at Contractor's option.

D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 12 inches apart with at least one fastener at each corner.

1. Install reinforcing channels or zees in ribs to span between supports and mechanically fasten.

E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Mechanically fasten to substrate to provide a complete deck installation.

1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.

F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

G. Sound-Absorbing Insulation: Installation into topside ribs of deck as specified in drawings.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Field welds will be subject to inspection.

C. Prepare test and inspection reports.

3.5 PROTECTION

A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780/A 780M and manufacturer's written instructions.

B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation and apply repair paint.

1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
2. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

C. Repair Painting: Wire brushing, cleaning, and repair painting of rust spots, welds, and abraded areas of both deck surfaces are included in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

END OF SECTION 05 31 00

SECTION 05 40 00 - LIGHT-GUAGE STEEL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide light gage steel framing shown on drawings and specified.

1.2 RELATED SECTIONS

A. Section 05 50 00 – METAL FABRICATIONS

1.3 REFERENCE STANDARDS

A. The latest edition of publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

AMERICAN IRON AND STEEL INSTITUTE (AISI)

1. Specification for Design of Cold-Formed Steel Structural Members

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

1.	ASTM A 123/A 123M	Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products
2.	ASTM A 153/A 153M	Zinc-Coated (Hot Dip) on Iron and Steel Hardware
3.	ASTM A 653/A 653M	Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process)
4.	ASTM A 570/A 570M	Structural Steel, Sheet and Strip, Carbon, Hot-Rolled
5.	ASTM A 611	Steel, Sheet, Carbon, Cold-Rolled, Structural Quality
6.	ASTM A 924/A 924M	Steel Sheet, Metallic-Coated by the Hot-Dip Process
7.	ASTM C 1007	Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories

AMERICAN WELDING SOCIETY (AWS)

1.4 QUALITY ASSURANCE

A. Component Design: Structural properties of steel members shall be in accordance with AISI Specification for Design of Cold-Formed Steel Structural Members.

B. Welding: Use qualified welders and materials that comply with AWS D1.3.

1.5 CONSTRUCTION REQUIREMENTS

A. The manufacturer of the framing system shall design the system including size, gage, strength, spacing of members, anchorage to structure, connections, angles, clips, bracing, strapping, bridging, supplementary framing, framing at openings, corners, and at control and expansion joints. Design provisions for movement of the structural and other components required to complete the framing systems indicated.

B. Framing system shall be designed by an engineer registered in the State of Florida to resist the construction loads indicated, and the design horizontal wind and wind uplift loads indicated on the drawings and all other loads as required by applicable building codes. Design of steel framing shall be in accordance with AISI Specification for the Design of Cold Formed Steel Structural Members.

C. Maximum allowable deflection of the systems under full lateral load shall not be more than L/360.

1.6 SUBMITTALS

A. (SD-01) (SD-02) Product Data: Manufacturer's product data and installation instructions for each item of lightgage framing and accessories.

B. (SD-04) Shop Drawings: Indicate each framing member with size, type and gage designations, quantity, location and spacing. Indicate and detail type of connections, anchorage to structure, supplemental framing, strapping, bracing, splices, bridging, accessories and other components and details required for proper installation.

C. (SD-05) Calculations: Submit structural calculations signed and sealed by a structural engineer, registered in the State of Florida which indicate all member sizes, spacings, connections and other pertinent design information. Calculations shall include analysis and design of all horizontal and vertical exterior metal studs and lightgage framing.

1.7 FIRE RATED ASSEMBLIES

A. Where framing units are components of assemblies indicated for a fire-resistance rating required for compliance with governing regulations, provide units that have been approved by governing authorities that have jurisdiction.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Subject to compliance with requirements, provide lightgage metal framing of one of the following:

1. Alabama Metal Industries Corp.

2. Bostwick Steel Framing Co.

3. Consolidated Systems, Inc. (CSI)

4. Dale/Incor Industries, Inc.

5. Dietrich Industries, Inc.

6. Gold Bond Building Products

7. Superior Steel Studs, Inc.

8. U.S. Gypsum

2.2 METAL FRAMING

A. System Components: Provide manufacturer's standard load bearing framing members. With each type of metal framing required, provide manufacturer's standard steel runners (tracks), blocking, lintels, clip angles, shoes, reinforcements, fasteners, anchorages, accessories and other components as recommended by manufacturer for applications indicated, as needed to provide a complete metal framing system.

B. Materials and Finishes:

1. For 16-gage and heavier units, fabricate metal framing components of structural quality steel sheet with a minimum yield of not less than 40,000 psi: ASTM A 653/A 653M, ASTM A 570/A 570M, or ASTM A 611.

2. For 18-gage units, fabricate metal framing components of commercial quality steel sheet with minimum yield point of not less than 33,000 psi; ASTM A 653/A 653M, ASTM A 570/A 570M or ASTM A 611.

3. Provide galvanized finish to all metal framing components and accessories. For sheet metal components comply with ASTM A 924/A 924M for minimum G60 coating. For structural steel shapes provide galvanized coating complying with ASTM A 123/A 123M. For hardware galvanized coating complying with ASTM A 153/A 153M.

C. C-Shape Studs: Manufacturer's steel C-shape studs of size indicated and of gage and structural properties required. Provide flanges of proper bearing area and type for attachment of materials.

D. Furring: Manufacturer's standard hat-shaped or Z-shaped steel furring members of gage and structural properties required.

E. Joists: Manufacturer's standard C-shape sections of size, shape and gage indicated or required by manufacturer's design.

F. Fasteners: Corrosion-resistant plated steel or stainless steel.

2.3 GALVANIZING REPAIR PAINT

A. Galvicon, ZRC or approved equivalent.

2.4 FABRICATION

A. Framing components may be prefabricated into panels prior to erection. Fabricate panels plumb, square, true to line and braced against racking with joints welded. Perform lifting of prefabricated panels in a manner to prevent damage or distortion.

B. Fastenings: Attach components by welding, bolting or screw fasteners, as standard with manufacturer and as required by design calculations.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install metal framing systems in accordance with requirements of ASTM C 1007, approved shop drawings and manufacturer's instructions and recommendations. Tolerance per ASTM C 1007 for vertical and horizontal alignment is not to exceed ⅛-inch in 10-feet; Corners not more than ±⅛-inch out-of-square within 4-feet each side of corner.

B. Temporary bracing of walls and other lightgage framing shall be provided during erection until such time it is no longer needed.

C. Runner Tracks: Install continuous tracks sized to match studs. Align tracks accurately

to layout at base and tops of studs. Secure tracks as recommended by manufacturer for type of construction involved, except do not exceed 24 inches o.c. spacing for powder-driven fasteners, or 16 inches o.c. for other types of attachment. Provide fasteners at corners and end of tracks.

D. Set studs plumb, except as needed for diagonal bracing.

E. Where stud system abuts structural columns or walls, anchor ends of stiffeners to supporting structure.

D. Install supplementary framing, blocking and bracing in metal framing system wherever walls or partitions are indicated to support fixtures, equipment, services, casework, heavy trim and furnishings, exterior metal panels and similar work requiring attachment to the wall or partition. Where type of supplementary support is not otherwise indicated, comply with stud manufacturer's recommendations and industry standards, considering weight or loading resulting from items supported.

3.2 GALVANIZE COATING REPAIR

A. Touch-up galvanized coatings damaged during handling, welding and installation with galvanizing repair paint.

END OF SECTION 05 40 00

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SECTION 05 50 00 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide miscellaneous metal work shown on the drawings, specified herein and required to complete the work.

B. Hot-Dip galvanize items as specified, scheduled or indicated and all anchors and plates for embedment in concrete or masonry miscellaneous steel as indicated.

1.2 RELATED SECTIONS

A. Section 05 40 00 Light-gauge Steel Framing
B. Section 06 22 00 Millwork
C. Section 06 60 16 Solid Surface Fabricators

1.3 REFERENCE STANDARDS

A. The latest edition of publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

1.	AISC ASD	Manual of Steel Construction Allowable Stress Design
2.	AISC LRFD	Manual of Steel Construction Load & Resistance Factor Design

AMERICAN IRON AND STEEL INSTITUTE (AISI)

1.	AISI Cold-Formed Specification	Specification & Commentary for the Design of Cold-Formed Steel Structural Members (Part V of the Cold-Formed Steel Design Manual)

ASTM INTERNATIONAL (ASTM)

1.	ASTM A 27/A 27M	Steel Castings, Carbon, for General Application

2.	ASTM A 36/A 36M	Carbon Structural Steel
3.	ASTM A 53	Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
4.	ASTM A 123/A 123M	Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products
5.	ASTM A 153/A 153M	Zinc-Coated (Hot Dip) on Iron and Steel Hardware
6.	ASTM A 283/A 283M	Low and Intermediate Tensile Strength Carbon Steel Plates
7.	ASTM A 307	Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
8.	ASTM A 366/A 366M	Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality
9.	ASTM A 449	Quenched and Tempered Steel Bolts and Studs
10.	ASTM A 500	Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
11.	ASTM A 574	Alloy Steel Socket-Head Cap Screws
12.	ASTM A 653/A 653M	Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process)
13.	ASTM A 666	Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar
14.	ASTM F 436	Hardened Steel Washers
15.	ASTM F 835	Alloy Steel Socket Button and Flat Countersunk Head Cap Screws

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M Structural Welding Code—Steel

2. AWS D1.2 Structural Welding Code—Aluminum

3. AWS D1.3 Structural Welding Code—Sheet Steel

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

1. NAAMM AMP 521 Pipe Railing Systems Manual

2. NAAMM AMP 500 Metal Finishes Manual for Architectural and Metal Products.

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

1. SSPC-SP 1 Solvent Cleaning

2. SSPC-SP 2 Hand Tool Cleaning

3. SSPC-SP 3 Power Tool Cleaning

4. SSPC-SP 7/NACE No. 4 Brush-Off Blast Cleaning

1.4 QUALITY ASSURANCE

A. Field Measurements: Verify shop drawing dimensions by field measurements prior to fabrication.

B. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly.

C. Certification of Welders: Welding shall be done by welders who are currently qualified by test procedures in AWS D1.1/D1.1M, AWS D1.2, and AWS D1.3.

1.5 SUBMITTALS

A. (SD-01) Manufacturer's Product Data: Submit for products to be used in fabrication of miscellaneous steel work, including shop primer and galvanized repair compound.

B. (SD-04) Shop Drawings: Submit for each miscellaneous steel item. Include plans, elevations, details, sections and connections. Show anchorage attachment and accessory items.

C. (SD-04) Submit drawings for the following:

1. Supports for counters, labs, baby changing table support

2. Diagonal supports as shown on drawings**.**

PART 2 - PRODUCTS

2.1 MATERIALS AND COMPONENTS

A. Metal Surfaces: For miscellaneous steel work which will be exposed to view, materials shall be smooth and free of surface blemishes including pitting, seam marks, rolled trade names and roughness.

B. Steel Plates, Shapes and Bars: ASTM A 36/A 36M.

C. Steel Plates to be Bent or Cold Formed: ASTM A 283/A 283M, Grade C.

D. Steel Tubing: Cold-formed, ASTM A 500 Grade B.

E. Steel Bars and Bar-Sized Shapes: ASTM A 663, Grade 65 or ASTM A 36/A 36M.

F. Carbon Steel Sheets:

1. Cold-Rolled: ASTM A 366/A 366M.

2. Galvanized: ASTM A 653/A 653M, with ASTM A 924/A 924M, G90 Zinc Coating.

G. Steel Pipe: ASTM A 53, type as selected; Grade A; galvanized, standard weight (Schedule 40), unless otherwise indicated.

H. Satainless Steel Tubing , Plates, Shapes and Bars: Stainless Steel 304. Finished as noted on the drawings.

I. Concrete Inserts: Cast steel, ASTM A 27/A 27M, expansion sleeves and steel bolts ASTM A 307, galvanized.

J. Nonshrink Nonferrous Grout: Meadows Sealtight V-3, Sonneborn Sonogrout or Thoro Thoroset.

2.2 FASTENERS

A. General: Provide zinc-coated fasteners for all interior and exterior use. Select fasteners for the type, grade and class required.

B. Bolts and Nuts: Regular hexagon head type, ASTM A 307, Grade A and ASTM A 449.

C. Lag Bolts: Hex head type, ASTM A 307, Grade A.

D. Machine Screws: Alloy steel, galvanized ASTM A 574 and ASTM F 835.

E. Plain Washers: Round, carbon steel, ASTM F 436.

F. Expansion Anchorage Devices: Type and size as required and approved for intended use.

G. Toggle Bolts: Tumble-wing type, class and style as required and approved for intended use.

H. Lock Washers: Helical spring type carbon steel.

I. Screws, bolts, nuts and washers, 304 Stainless steel finished as noted on drawings.

2.3 ROUGH HARDWARE

A. Furnish standard and custom fabricated bolts, plates, anchors, hangers, dowels and other miscellaneous steel shapes as required for framing and supporting wood and steel work, and for anchoring or securing steel and wood to concrete or other structures.

B. Manufacture or fabricate rough hardware items of sizes, shapes and dimensions required. Furnish malleable iron washers for heads and nuts which bear on wood structural connections; elsewhere, furnish steel washers.

2.4 SHOP PRIMER

A. Provide a universal primer as recommended by the manufacturer for the type metal being primed. Coordinate selection of metal primer with finish paint requirements specified in SECTION 09 91 00 - PAINTING. Primer selected must be compatible with finish coats of paints. Acceptable primers: Glidden Glid-Guard No. 5205; Sherwin-Williams Galvite B50 W3; Tnemec Galv-Guard Series 22; Southern Coatings Enviro-Guard 1-6227; or approved equivalent.

2.5 SHOP FABRICATION

A. Workmanship: Use materials of size and thickness shown, or, if not shown, of requirement size and thickness to produce strength and durability in finished product.

Work to dimensions shown or accepted on shop drawings, using proven details of fabrication and support. Use type of materials shown or specified for various components of work.

B. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately $^{1}/_{32}$-inch unless otherwise shown. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

C. Weld corners and seams continuously, complying with AWS recommendations. At exposed connections, grind exposed welds smooth and flush to match and blend with adjoining surfaces.

D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of type shown or, if not shown, Phillips flat-head screws or bolts.

1. Provide for anchorage of type shown, coordinated with supporting structure. Fabricate and space anchoring devices to provide adequate support for intended use.

2. Cut, reinforce, drill and tap miscellaneous steel work as indicated to receive finish hardware and similar items.

2.6 SHOP PRIMING

A. Shop prime miscellaneous steel work including galvanized items, except members or portions of members to be embedded in concrete and masonry and surfaces and edges to be field welded.

B. Remove scale, rust and other deleterious materials before applying shop coat.

1. Remove oil, grease and similar contaminants in accordance with SSPC-SP 1 Solvent Cleaning.

2. Clean off rust and loose mill scale in accordance with SSPC-SP 2 Hand Tool Cleaning, or SSPC-SP 3 Power Tool Cleaning or SSPC-SP 7/NACE No. 4 Brush-Off Blast Cleaning.

C. Immediately after surface preparation, brush or spray on primer in accordance with manufacturer's instructions, and at a rate to provide uniform dry film thickness of 1.5 mils for each coat. Use painting methods which will result in full coverage of joints, corners, edges and exposed surfaces.

D. Apply one shop coat of primer to all fabricated metal items. Apply second coat or primer to surfaces inaccessible after assembly and erection. Change of second coat to distinguish it from the first.

2.7 GALVANIZING

A. Provide a zinc coating for items shown and for items specified to be galvanized. Hot-dip galvanize after fabrication unless otherwise specified or indicated.

1. ASTM A 153/A 153M for galvanizing iron and steel hardware.

2. ASTM A 123/A 123M for galvanizing rolled, pressed and forged steel shapes, plates, bars and strips ⅛-inch thick and heavier.

3. ASTM A 123/A 123M for galvanizing assembled steel products.

B. Galvanizing Repair Compound: High zinc dust content for regalvanizing welds and damaged galvanized surfaces. Provide ZRC by ZRC Chemical Products Co. or Galvicon by Kenco Division of Southern Coatings.

2.8 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry and concrete construction fabricate flat, free from warp and twist, and of required thickness and bearing areas. Drill plates to receive anchor bolts and for grouting as required. Galvanize items specified and items indicated.

2.9 LOOSE STEEL LINTELS

A. Provide loose structural steel lintels for openings and recesses in masonry walls and partitions as shown. Weld adjoining members together, to provide pipe separators, to form a single unit where indicated. Space welds not over 12 inches apart unless shown otherwise. Provide not less than 8 inches bearing at each side of openings, unless otherwise shown. Galvanize loose steel lintels to be installed in exterior walls.

2.10 MISCELLANEOUS FRAMING AND SUPPORTS

A. Provide miscellaneous steel framing and supports which are not a part of structural steel framework, as required to complete work.

B. Fabricate miscellaneous steel framing and support units to size, shapes and profiles shown, or, if not shown, of required dimensions to receive adjacent work and other work to be supported by framing. Except as otherwise shown, furnish units fabricated from structural steel shapes, plates and steel bars, and of welded construction using mitered joints for field connection. Cut, drill and tap units to receive hardware and

similar items.

C. Furnish drilled-in type expansion anchors for items that are required to be installed at concrete slab.

1. Except as otherwise shown, space anchors 24 inches o.c. and provide minimum anchors of 1¼ x ¼ x 8 inch steel straps.

2. Galvanize miscellaneous frames and supports specified and indicated. All items exposed to weather shall be galvanized.

2.11 MISCELLANEOUS STEEL TRIM

A. Provide shapes and sizes for profiles shown. Except as otherwise noted, fabricate units from structural steel shapes and plates and steel bars, with continuously welded joints and smooth exposed edges. Use concealed field splices wherever possible. Provide cutouts, fittings and anchorages as required for coordination of assembly and installation with other work. Galvanize miscellaneous steel trim exposed to weather and other trim where indicated.

2.12 STAINLESS STEEL TRIM

A. Provide shapes, sizes and finish for profiles shown.

1. Stainless Steel 304 finished as noted on drawings. If not noted use finish: #4 (dull).

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install manufactured items according to printed directions of the manufacturer except as specified otherwise or modified by details.

B. Install, anchor and make field connections in accordance with approved shop drawings.

C. To prevent electrolysis, separate contacting surfaces of dissimilar metals with one ply of 15-pound asphalt-saturated felt or a bituminous coating.

D. Repair damaged areas of galvanized surfaces with galvanizing repair paint before and after installation.

E. Use setting drawings, diagrams, templates, manufacturer's instructions and

directions for installation of anchorages such as concrete inserts, anchor bolts and miscellaneous items having integral anchors, which are to be embedded in concrete and embedded in masonry.

F. Fit exposed connections accurately together to form tight hairline joints. Weld connections which are not to be left as exposed joints, but cannot be shop welded because of shipping size limitations. Grind exposed joints smooth and touch-up shop primer. Do not weld, cut or abrade the surfaces of exterior units which have been hot-dip galvanized after fabrication, and are intended for bolted field connections.

G. Permanently weld shelf angles after last course of masonry, immediately below the angle, has been laid.

H. Secure strap anchors to forms so shelf angles can be welded in place at proper elevation.

END OF SECTION 05 50 00

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SECTION 05 81 01 - EXPANSION JOINT COVERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawing and general provisions of the Contract, including Contractual and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Floor expansion joint cover assemblies.
2. Wall expansion joint cover assemblies.
3. Ceiling expansion joint cover assemblies.
4. Soffit expansion joint cover assemblies.
5. Expansion joint cover system.

1.3 SUBMITTALS

A. General: Submit the following according to Conditions of the Contract and Division 1 Specification Sections.

1. (SD-01)(SD-02) Product data for each type of expansion joint cover assembly specified, including manufacturer's product specifications, installation instructions, details of construction relative to materials, dimensions of individual components, profiles, and finishes.
2. (SD-04) Shop drawings showing fabrication and installation of expansion joint cover assembly including plans, elevations, sections, details of components, joints, splices, and attachments to other units of Work.
3. (SD-14)(SD-15) Samples for initial selection purposes in the form of manufacturer's color charts, actual units, or sections of units showing full range of colors, textures, and patterns available for each exposed metal and elastomeric material of expansion joint cover assembly indicated.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility: Obtain expansion joint cover assemblies specified in this Section from one source from a single manufacturer. Coordinate compatibility with expansion joint cover assemblies specified in other sections.

B. Pre-Installation Conference: Include Architect, Owner Representative, joint cover and fireproofing seal manufacturer Technical Representatives, and installer.

C. Mock Up: Fabricate mock ups for each type/ system for review by Architect. Mock up shall be kept at site trailer for reference.

D. Fire-Test-Response Characteristics: Where indicated, provide expansion joint cover assemblies identical to those assemblies whose fire resistance has been determined per ANSI/UL 263, NFPA 251, U.B.C. 43-1, or ASTM E 119, including hose stream test of vertical wall assemblies, by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Not less than the rating wall, ceiling, soffit, deck, beam and slab assembly where the joint resides.

1.6 WARRANTY

A. Manufacturer Warranty: 5 year manufacturer's warranty, on products against defect and watertight guarantee.

B. Installer Warranty: 2 year workmanship warranty against failure of watertightness or all aspects of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specified Manufacturers and Model Numbers: Subject to compliance with requirements, products that may be incorporated in the Work include, but are not limited to, those specified.

B. Special Cover Mark Numbers, Model and Manufacturer – Basis of Design:

1. Ceiling Joint: EK-K1; 1-inch wide; MM Systems.
2. Wall Joint: "Emseal" Joint Systems Ltd. (EJS) "Seismic Colorseal" or approved equal "Willseal"
3. Expansion Joint Cover Corner Piece Type 3: ESC-500; Construction Specialties, Inc.”

C. Expansion Joint Cover System, Model and Manufacturer - Basis of Design:

1. Series FS 75 Migutran S; Migua, Westborough, MA.

2.2 MATERIALS

A. Aluminum: ASTM B 221, alloy 6063-T5 for extrusions; ASTM B 209, alloy 6061-T6, sheet and plate.

1. Protect aluminum surfaces to be placed in contact with cementitious materials with a protective coating.

B. Stainless Steel: ASTM A 167, Type 304 with 2B finish, unless indicated otherwise, for plates, sheet, and strips.

C. Extruded Preformed Seals: Single or multicellular elastomeric profiles as classified under ASTM D 2000, designed with or without continuous, longitudinal, internal baffles. Formed to fit compatible frames, in color indicated or, if not indicated, as selected by Architect from manufacturer's standard colors.

D. Preformed Sealant: Manufacturer's standard elastomeric sealant complying with ASTM C 920, Use T, factory-formed and -bonded to metal frames or anchor members; in color indicated or, if not indicated, as selected by Architect from manufacturer's standard colors.

1. Joints 2 Inches Wide and Less: Withstand plus or minus 35 percent movement of the joint width without failure.
2. Joints Greater Than 2 Inches to 4 Inches Wide: Withstand plus or minus 50 percent movement of the joint width without failure.

E. Fire Barriers: Designed for indicated or required dynamic structural movement without material degradation or fatigue when tested according to ASTM E 1399. Tested in maximum joint width condition with a field splice as a component of an expansion joint cover per ANSI/UL 263, NFPA 251, U.B.C. 43-1, or ASTM E 119, including hose stream test of vertical wall assemblies by a nationally recognized testing and inspecting agency acceptable to authorities having jurisdiction.

F. Accessories: Manufacturer's standard anchors, fasteners, set screws, spacers, flexible moisture barrier and filler materials, drain tubes, lubricants, adhesive, and other accessories compatible with material in contact, as indicated or required for complete installations.

G. Intersections: All exterior expansion joint seals will have factory fabricated transitions for use in all directional changes IE: "T" intersections and "L" intersections.

2.3 EXPANSION JOINT COVER ASSEMBLIES

A. General: Provide expansion joint cover assemblies of design, basic profile, materials, and operation indicated. Provide units comparable to those indicated or required to accommodate joint size, variations in adjacent surfaces, and dynamic structural movement without material degradation or fatigue when tested according to ASTM E 1399. Furnish units in longest practicable lengths to minimize number of end joints. Provide hairline mitered corners where joint changes directions or abuts other materials. Include closure materials and transition pieces, tee-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous joint cover assemblies.

B. Moisture Barrier: Provide manufacturer's continuous, standard, flexible vinyl moisture barrier under covers at locations indicated.

C. Fire-Rated Joint Covers: Provide expansion joint cover assemblies with manufacturer's continuous, standard, flexible fire barrier seals under covers at locations indicated to provide fire-resistive rating not less than the rating of adjacent construction.

D. Coverless Fire Barrier: Provide manufacturer's continuous standard flexible fire barrier seals at locations indicated to provide fire-resistive rating not less than the rating of adjacent construction.

E. Metal Floor-to-Floor Joint Cover Assemblies: Provide continuous extruded metal frames of profile indicated with seating surface and raised floor rim or exposed trim strip to accommodate flooring and concealed bolt and anchors embedded in concrete. Provide assemblies formed to receive cover plates of design indicated and to receive filler materials (if any) between raised rim of frame and edge of plate. Furnish depth and configuration to suit type of construction and to produce a continuous flush wearing surface with adjoining finish floor surface.

F. Floor-to-Wall Joints: Provide one frame on floor side of joint only. Provide wall side frame where required by manufacturer's design.

1. Angle Cover Plates: Attach angle cover plates for floor-to-wall joints to wall with countersunk, flat-head exposed fasteners secured to drilled-in-place anchor shields, unless otherwise indicated, at spacing recommended by joint cover manufacturer.

G. Wall, Ceiling, and Soffit Joint Cover Assemblies: Provide interior wall and ceiling expansion joint cover assemblies of same design and appearance. Provide exterior wall and soffit expansion joint cover assemblies of same design and appearance. Provide wall expansion joint cover assemblies compatible with floor expansion joint cover assemblies design and appearance.

H. All expansion joint seal materials will be 100% free of was and asphaltic compounds.

2.4 METAL FINISHES

A. General: Comply with NAAMM "Metal Finishes Manual" for finish designations and application recommendations, except as otherwise indicated. Apply finishes to products in factory after fabrication. Protect finishes on exposed surfaces before shipment.

B. Aluminum Finishes: Mill finish.

C. Stainless Steel Finishes: Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.

1. Bright, Cold-Rolled Unpolished Finish: AISI No. 2B finish.

PART 3 - EXECUTION

3.1 PREPARATION

A. Manufacturer's Instructions: In addition to requirements of these specifications, comply with manufacturer's instructions and recommendations for phases of Work, including preparing substrate, applying materials, and protecting installed units.

B. Coordinate and furnish anchorages, setting drawings, templates, and instructions for installation of expansion joint cover assemblies to be embedded in or anchored to concrete or to have recesses formed into edges of concrete slab for later placement and grouting-in of frames.

C. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary to secure expansion joint cover assemblies to in-place construction, including threaded fasteners with drilled-in expansion shields for masonry and concrete where anchoring members are not embedded in concrete. Provide fasteners of metal, type, and size to suit type of construction indicated and provide for secure attachment of expansion joint cover assemblies.

3.2 INSTALLATION

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required to install expansion joint covers. Install joint cover assemblies in true alignment and proper relationship to expansion joints and adjoining finished surfaces measured from established lines and levels. Allow adequate free movement for thermal expansion and contraction of metal to avoid buckling. Set floor covers at elevations to be flush with adjacent finished floor materials. Locate wall, ceiling, and soffit covers in continuous contact with adjacent surfaces. Securely attach in place with required accessories. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches on center.

B. Continuity: Maintain continuity of expansion joint cover assemblies with a minimum number of end joints and align metal members mechanically using splice joints. Cut and fit ends to produce joints that will accommodate thermal expansion and contraction of metal to avoid buckling of frames. Adhere flexible filler materials (if any) to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.

C. Extruded Preformed Seals: Install seals complying with manufacturer's instructions and with minimum number of end joints. For straight sections provide preformed seals in continual lengths. Vulcanize or heat-weld field splice joints in preformed seal material to provide watertight joints using procedures recommended by manufacturer. Apply adhesive, epoxy, or lubricant-adhesive approved by manufacturer to both frame interfaces before installing preformed seal. Seal transitions according to manufacturer's instructions.

D. Elastomeric Sealant Joint Assemblies: Seal end joints within continuous runs and joints at transitions according to manufacturer's directions to provide a watertight installation.

E. Fire Barriers: Install fire barriers, including transitions and end joints, according to manufacturer's instructions so that fire-rated construction is continuous.

3.3 CLEANING AND PROTECTION

A. Do not remove protective covering until finish work in adjacent areas is complete. When

protective covering is removed, clean exposed metal surfaces to comply with manufacturer's instructions.

END OF SECTION 05 81 01

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section includes the following:

1. Wood grounds, nailers, blocking, and panels.
2. Temporary wall and ceiling construction.
3. Wood furring.
4. Sheathing.

B. Drawings and General Conditions/Provisions of Contract, including Contractual Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 REFERENCE STANDARDS

A. The latest edition of publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

APA - THE ENGINEERED WOOD ASSOCIATION (APA)

1. APA F405 — Product Guide Performance Rated Panels

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

1. ANSI B18.2.1 — Square and Hex Bolts and Screws Inch Series
2. ANSI B18.6.1 — Wood Screws (Inch Series)

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

1. ASTM A153/A153M — Zinc Coating (Hot-Dip) on Iron and Steel Hardware
2. ASTM A307 — Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength
3. ASTM A563 — Carbon and Alloy Steel Nuts

4.	ASTM E84	Surface Burning Characteristics of Building Materials
5.	ASTM E 96	Water Vapor Transmission of Materials

AMERICAN WOOD-PRESERVERS' ASSOCIATION (AWPA)

1.	AWPA C2	Lumber, Timbers, Bridge Ties and Mine Ties - Preservative Treatment by Pressure Processing
2.	AWPA C9	Plywood - Preservative Treatment by Pressure Processes
3.	AWPA C20	Structural Lumber - Fire-Retardant Pressure Treatment
4.	AWPA C27	Plywood - Fire-Retardant Pressure Treatment
5.	AWPA M4	Standard for the Care of Preservative-Treated Wood Products

FEDERAL SPECIFICATIONS (FS)

1.	FS FF-N-105	Nails, Brads, Staples and Spikes: Wire, Cut and Wrought

FLORIDA BUILDING CODE

1. 2017 Issue with modifications and updates

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

1. Manual for House Framing

SOUTHERN PINE INSPECTION BUREAU (SPIB)

1. Standard Grading Rules for Southern Pine Lumber

U.S. DEPARTMENT OF COMMERCE PRODUCT STANDARDS (PS)

1.	PS-1	Construction and Industrial Plywood
2.	PS-20	American Softwood Lumber Standard

WEST COAST LUMBER INSPECTION BUREAU (WCLIB)

A. Lumber Standard: Comply with NBS Voluntary Product Standard PS 20, American Softwood Lumber Standard.

B. Plywood Standard: Comply with U.S. Product Standard PS 1, Construction and Industrial Plywood.

C. Wood Treatment: American Wood Preservers Association (AWPA).

B. Plywood Standard:

C. Wood Treatment:

1.4 SUBMITTALS

A. SD-13; Material certificates for dimensional lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use as well as design values approved by the Board of Review of American Lumber Standards Committee.

B. SD-02; Manufacturer's product data as follows including chemical treatment manufacturer's instructions for handling, storing, installation, and finishing of treated material.

1. Submit one (1) electronic copy to the RPR & A/E in PDF or DWG format of the product data for each product specified.

2. For each type of preservative-treated wood product, include certification by treating plant stating type of preservative solution and pressure process used, net amount of preservative retained, and compliance with applicable standards.

3. For water-borne treated products, include statement that moisture content of treated materials was reduced to levels indicate prior to shipment to project site.

4. For fire-retardant-treated wood products, include certification by treating plant that treated material compiles with specified standard and other requirements.

5. Material test reports from qualified independent testing laboratory indicating and interpreting test results relative to compliance of fire-retardant-treated wood products with requirements indicated.

6. Warranty of chemical treatment manufacturer for each type of treatment.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber, as well as plywood and other panels; provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.

B. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

A. Furnish lumber manufactured to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.

B. Inspection agencies and the abbreviations used to reference them with lumber grades and species include the following:

1. SPIB - Southern Pine Inspection Bureau

2. WCLIB - West Coast Lumber Inspection Bureau

3. WWPA - Western Wood Products Association

C. Grade Stamps: Provide lumber with each piece factory-marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.

D. Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for moisture content specified for each use.

1. Provide dressed lumber, S4S, unless otherwise indicated.

2. Provide seasoned lumber with 19% maximum moisture content at time of dressing and shipment for sizes 2” or less in nominal thickness, unless otherwise indicated.

2.2 DIMENSION LUMBER

A. For light framing (2” to 4” thick, 2” to 4” wide), provide the following grade and species:

1. "Construction" Grade No. 1

2. Southern Pine graded under SPIB rules, or approved equivalent.

B. For structural light framing (2” to 4” thick, 2” to 4” wide), provide the following grade and species:

1. SPIB "No. 2" Grade

2. Same species as indicated for structural framing grade below.

C. For structural framing (2” to 4” thick, 5” and wider), provide the following grade and species:

1. SPIB "No. 2" Grade

2. Southern Pine graded under SPIB rules.

D. For exposed framing lumber, provide material complying with the following requirements:

1. Definition: Exposed framing refers to dimension lumber that is not concealed by other construction and is indicated to receive a stained or natural finish.

2. Grading: Material hand selected at factory from lumber of species and grade indicated below that complies with "Appearance" grade requirements of ALSC National Grading Rule; issue inspection certificate of inspection agency for selected material.

3. Same species and grade as indicated for structural framing.

2.3 MISCELLANEOUS LUMBER

A. General: Provide lumber for support or attachment of other construction including rooftop equipment curbs and support bases, cant strips, bucks, nailers, blocking, furring, grounds, stripping, and similar members.

B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.

C. Moisture Content: 19% maximum for lumber items not specified to receive wood-preservative treatment.

D. Grade: "Standard" grade light-framing-size lumber of any species or board-size lumber as required. "No. 3 Common" or "Standard" grade boards per WCLIB or WWPA rules or "No. 2 Boards" per SPIB rules.

2.4 CONCEALED PERFORMANCE-RATED CONSTRUCTION PANELS

A. General: Where construction panels are indicated for the following concealed types of applications, provide APA F405 Performance-Rated Panels complying with requirements designated under each application for grade designation, span rating, exposure durability classification, edge detail (where applicable), and thickness.

B. Wall Sheathing: APA F405 Rated Sheathing.

1. Exposure Durability Classification: EXPOSURE 1.

2. Span Rating: As required to suit stud spacing indicated.

2.5 CONSTRUCTION PANELS FOR BACKING

A. Plywood Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant-treated plywood panels with grade designation, APA F405 C-D PLUGGED EXPOSURE 1, in thickness indicated or, if not otherwise indicated, not less than 15/32".

2.6 FASTENERS

A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture. Where rough carpentry is exposed to weather, in ground contact, or in area of high-relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A153/A153M or of AISI Type 304 stainless steel.

1. *All fasteners in contact with Fire Retardant wood treated products will be stainless steel.*

B. Nails, Wire, Brads, and Staples: FS FF-N-105.

C. Lag Bolts: ANSI B18.2.1.

D. Bolts: Steel bolts complying with ASTM A307, Grade A; with ASTM A563 hex nuts and where indicated, flat washers.

2.7 PRESERVATIVE WOOD TREATMENT BY PRESSURE PROCESS

A. General: Where lumber or plywood is indicated as preservative-treated wood, or is specified herein to be treated, comply with applicable requirements of AWPA Standards C2 (Lumber) and C9 (Plywood). Mark each treated item with the AWPA or SPIB Quality Mark Requirements.

B. Pressure treat above-ground items with water-borne preservatives to a minimum retention of 0.25 pcf. For interior uses, after treatment, kiln-dry lumber and plywood to a maximum moisture content, respectively, of 19% and 15%. Treat indicated items and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, and waterproofing.

2. Wood floor plates installed over concrete slabs directly in contact with earth.

C. Pressure treat wood members in contact with the ground or fresh water with water-borne preservatives to a minimum retention of 0.40 pcf.

D. Complete fabrication of treated items prior to treatment, where possible. If cut after treatment, coat cut surfaces to comply with AWPA M4. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

2.8 FIRE-RETARDANT TREATMENT BY PRESSURE PROCESS

A. General: Fire-retardant-treated wood is required throughout the entire building, pressure impregnate lumber and plywood with fire-retardant chemicals to comply with AWPA C20 and C27, respectively, for treatment type indicated; identify "fire-retardant-treated wood" with appropriate classification marking of Underwriters Laboratories, Inc., U.S. Testing, Timber Products Inspection, Inc. or other testing and inspecting agency acceptable to authorities having jurisdiction.

1. Current Evaluation/Research Reports: Provide fire-retardant-treated wood for which a current model code evaluation/research report exists that is acceptable to authorities having jurisdiction and that evidences compliance of fire-retardant-treated wood for application indicated.

B. Interior Type A: For interior locations, use fire-retardant chemical formulation that produces treated lumber and plywood with the following properties under conditions present after installation:

1. No reduction takes place in bending strength, stiffness, and fastener-holding capacities below values published by manufacturer of chemical formulation that are based on tests by a qualified independent testing laboratory of treated-wood products identical to those indicated for this project under elevated temperature and humidity conditions simulating installed conditions.

2. No other form of degradation occurs due to acid hydrolysis or other causes related to manufacture and treatment.

3. No corrosion of metal fasteners result from their contact with treated wood.

C. Exterior Type: Use for exterior locations and where indicated.

D. Inspect each piece of treated lumber or plywood after drying and discard damaged or defective pieces.

E. Available Products: Subject to compliance with requirements, fire-retardant-treated wood products that may be incorporated in the work include, but are not limited to, the following:

1. Interior-Type, Fire-Retardant-Treated Wood:

a. "Dricon," Hickson Corporation

b. "Pyro-Guard," Hoover Treated Wood Products

c. "Flameproof LHC-HTT," Osmose Wood Preserving Co., Inc.

2. Exterior-Type, Fire-Retardant-Treated Wood:

a. "Exterior Fire-X," Hoover Treated Wood Products

2.9 ISOLATION MEMBRANE

A. WR GRACE, Perma Barrier Membrane or approved equal.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Discard units of material with defects that impair quality of rough carpentry construction and that are too small to use in fabricating rough carpentry with minimum joints or optimum joint arrangement.

B. Set rough carpentry to required levels and lines with members plumb and true to line and cut and fitted.

C. Fit rough carpentry to other construction; scribe and cope as required to accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.

D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated.

E. Countersink nail heads on exposed carpentry work and fill holes.

F. Countersink all anchor bolts at parapet. Top of anchor bolt to be flush with top of plate. File down rough bolt edge.

G. Use common wire nails, unless otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; predrill as required.

H. Fire retardant wood in contact with metal shall be isolated with a separator layer of " Grace Perma Barrier", or equal, membrane continuous at all locations.

END OF SECTION 06 10 00

SECTION 06 22 00 - MILLWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Proposed plastic-laminate wall panel to the extent show on the drawings.

2. Proposed plastic-laminate Cabinetry/casework to the extent show on the drawings.

1.3 DEFINITIONS

A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items, unless concealed within other construction before woodwork installation.

1.4 SUBMITTALS

A. (SD-01)(SD-02) Product Data: For each type of product indicated including cabinet hardware, and accessories.

B. (SD-04) Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.

1. Show details full size.

2. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.

3. Show locations and sizes of cutouts and holes for plumbing fixtures, and other items installed in architectural woodwork.

4. Show details and installation of stainless steel cover system.

C. (SD-16) Samples for Verification: Where material finish and colors are indicated submit the following:

1. Plastic-laminate-clad panel products, 8 by 10 inches, for each type, color, pattern, and surface finish, with separate samples of unfaced panel product used for core.

2. Solid surface material, 8 by 10 inches, for each color and pattern.

3. One sample each of each hardware component, hinges, pull, shelves, drawer extensions, locks and plastic escutcheon and wire tray.

D. (SD-10) Product Certificates: Signed by manufacturers of woodwork certifying that products furnished comply with requirements.

E. (SD-13) Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who has completed architectural woodwork similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Fabricator Qualifications: A firm experienced in producing architectural woodwork similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork, construction, finishes, and other requirements.

D. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and will maintaining temperature between 60 and 90 degrees F and relative humidity between 43 and 70 percent during the remainder of the construction period.

C. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed and indicate measurements on Shop Drawings.

1.8 COORDINATION

A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that interior architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Provide materials that comply with requirements of the AWI quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.

B. Wood Products: Comply with the following:

1. Hardboard: AHA A135.4.

2. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.

3. Softwood Plywood: DOC PS 1, Medium Density Overlay.

4. Hardwood Plywood and Face Veneers: HPVA HP-1.

5. All wood products shall be Fire Retardant.

C. Thermoset Decorative Overlay: Particleboard complying with ANSI A208.1, Grade M-2, or medium-density fiberboard complying with ANSI A208.2, Grade MD, with surface of thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.

D. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.

E. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.

1. Colors and Patterns: Match Architect's samples as noted on drawings AF712

2.2 INSTALLATION MATERIALS

A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln-dried to less than 15 percent moisture content.

B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or stainless steel anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

2.3 FABRICATION, GENERAL

A. Cabinets: Prepare surfaces to receive high pressure laminate in accordance with plastic laminate manufacturer's instructions and recommendations.

B. Casework Grade: Custom Grade interior woodwork complying with the referenced quality standard.

C. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.

D. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members 3/4 Inch Thick or Less: 1/16 inch.

2. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.

3. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch.

4. All wood shall be Fire Retardant.

E. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.

2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as

intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.

F. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

1. Seal edges of openings in countertops with a coat of varnish.

2.4 PLASTIC-LAMINATE PANELS

A. Manufacturers

1. Design is based upon products by the following manufacturers:

a. Formica Corporation.

b. Wilsonart.

c. Pionite.

2. Other acceptable manufacturers:

a. Nevamar.

b. Lamin-Art.

B. Grade: AWI Section 400B, Premium Grade.

C. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:

1. Vertical Surfaces: GP 28, General-Purpose Type 0.028-inch thick.

2. Horizontal Surfaces: GP 50, General-Purpose Type, 0.048-inch thick..

3. Cabinet Liner (Exposed Surfaces): CL 20, Cabinet-liner Type, 0.020-inch thick.

D. Colors, Patterns, and Finishes: Refer to the Casework Color Legend.

1. To match architect sample or to match existing.

2.5 CABINET HARDWARE AND ACCESSORY MATERIALS

A. General: Provide cabinet hardware and accessory materials associated with cabinetwork.

B. Hardware Standards: Comply with ANSI A156.9 American National Standard for Cabinet Hardware, Grade 1.

C. Cabinet Hardware Schedule: Provide cabinetwork hardware as scheduled. Install as recommended by the hardware manufacturer.

1. Hinges: Concealed, 3-way adjustable System 1006 by Grass America, Inc. or approved equivalent.

2. Pulls: No. 4484 by Stanley or approved equivalent; one for each drawer and door.

3. Locks: Five pin tumbler type, master keyed to building system; Finish US 26.

a. Cabinet doors provide No. 511 (deadbolt) by Yale Security Inc. or approved equivalent.

b. Drawers provide No. 9402 by Yale Security Inc. or approved equivalent.

4. Drawer Guides: Full extension, 150-lbs. capacity, Model No. C3600 by Accuride; System VS603 by Grass America, Inc. or approved equivalent.

5. Catches: Magnetic, No. 40 Series by Stanley, or approved equivalent.

6. Shelf Standards and Supports: No. 255 Standards and No. 256 supports by Knape and Vogt, or approved equivalent.

7. Plastic Grommet Mockett CO "XG"

8. Under Counter metal wire cable tray.

D. Exposed Hardware Finish: Except where not available, provide exposed hardware with BHMA Code 626 satin chromium plate finish (US26D); where not available, provide either satin aluminum or satin stainless steel finish.

PART 3 - EXECUTION

3.1 PREPARATION

A. Condition woodwork to average prevailing humidity conditions in installation areas before installation.

B. Before installing architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and back priming.

3.2 INSTALLATION

A. Quality Standard: Install woodwork to comply with AWI Section 1700 for the same grade specified in Part 2 of this Section for type of woodwork involved.

B. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches.

C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.

D. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.

E. Panels: Install without distortion fit openings properly and are accurately aligned.

1. Install panels with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

F. Complete the finishing work specified in this Section to extent not completed at shop or before installation of woodwork. Fill nail holes with matching filler where exposed.

G. Install all hardware using manufacturer's provided templates.

H. Install locks as indicated on drawing if not. Install locks on all doors and drawings of Gate check in podiums.

3.3 ADJUSTING AND CLEANING

A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.

B. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06 22 00

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SECTION 06 60 16 - SOLID SURFACE FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Lavatory countertops
2. Baby changing stations
3. Backsplash/ Skirts/Trim
4. Waste basket sliding drawer enclosure.
5. Other Miscellaneous work depicted on the drawings.

B. Custom work will require field verification of existing conditions prior to fabrication and final shop drawing.

1.2 Related Documents

A. Drawings and General Provisions of the Contract, including General and Supplemental Conditions and Division 1 apply to this section:

1. Section 05 50 00 Metal Fabrication
2. Section 08 80 00 Glazing
3. Section 09 21 16 Gypsum Board Assemblies
4. Section 09 22 16.13 Interior Metal Framing
5. Section 09 30 00 Tiling
6. Section 10 28 13 Toilet Accessories
7. Division 22 Plumbing
8. Division 26 Electrical

1.2 REFERENCES

A. Standards:

1. ANSI/NPA A208.2-09 - Medium Density Fiberboard (MDF) For Interior Applications
2. ASTM C920-14a - Standard Specification for Elastomeric Joint Sealants
3. ASTM D638-10 - Standard Test Method for Tensile Properties of Plastics
4. ASTM D785-08 - Standard Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials
5. ASTM D790-10 - Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
6. ASTM D5420-10 - Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact)

7. ASTM E84-14 - Standard Test Method for Surface Burning Characteristics of Building Materials
8. ASTM E228-11 - Standard Test Method for Linear Thermal Expansion of Solid Materials with a Push-Rod Dilatometer
9. ASTM G21-13 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
10. ASTM G22-76(96) - Standard Practice for Determining Resistance of Plastics to Bacteria
11. ASTM G155-13 - Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials
12. CSA B45.5-11/ IAPMO Z124-2011 - Plastic Plumbing Fixtures
13. NFPA 255-06 - Standard Method of Test of Surface Burning Characteristics of Building Materials
14. NSF/ANSI 51-07 - Food Equipment Materials
15. SCAQMD Rule 1168 - Adhesive and Sealant Applications (amended January 2005)
16. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials
17. UL Environment/ - Standard for Chemical Emissions for Building Materials, GREENGUARD -Finishes and Furnishings, Section 7.1 UL 2818
18. UL Environment/- Gold Standard for Chemical Emissions for Building Materials, GREENGUARD- Finishes and Furnishings, Section 7.1 and 7.2 UL 2818
19. UL 2824 - GREENGUARD Certification Program, Method for Measuring Microbial Resistance from Various Sources Using Static Environmental Chambers

1.3 SUBMITTALS

A. (SD-01)(SD-02)(SD-10)(SD-13) Product Data: Manufacturer's data sheets on each product to be used, including:

1. Details of fabrication.
2. Recommendations for handling, protection, and maintenance.
3. For fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

B. (SD-04) Shop Drawings: Show assembly methods, joint details, plans, sections and elevations and accessories.

1. Show field measurements and concealed framing, blocking, and reinforcement locations

C. (SD-16) Samples: For each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

1.4 QUALITY ASSURANCE

A. Supply lavatory countertops, backsplashes, trim, waste basket drawers,

cabinet skirt/access panel and baby changing stations from one manufacturer.

B. Provide 5 years of successful documented experience in fabrication and installation of the Product. Provide certificate of training by manufacturer of the Product.

B. Tolerances:

1. Variation in component size: +/- 1/8 inch
2. Location of openings: +/- 1/8 inch from indicated location

C. Perform work to custom quality in accordance with "Quality Standards" of the Architectural Woodwork Institute (AWI).

D. Fire-Test-Response Characteristics: Provide materials and products with specified fire-test-response characteristics as determined by testing identical products per test method indicated by UL or another nationally known testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver cast polymer materials until painting and similar operations that could damage synthetic marble have been completed in installation areas. If cast polymer materials must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

B. Handle materials to prevent damage to finished surfaces. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install cast polymer materials until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

B. Field Measurements: Where cast polymer materials are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication.

1. Coordinate concealed framing, blocking, and reinforcements that support cast polymer materials work.

1.7 WARRANTY

Manufacturer: Provide manufacturer's standard warranty for material for period of 10 years against defects. Promptly correct any defects or deficiencies which become apparent within warranty period.

Installation: Provide installation warranty for installation and workmanship for period of 5 years against installation defects. Promptly correct any defects which become apparent within the warranty period.

PART 2 - PRODUCTS

2.1 CAST POLYMER

A. Manufacturer: Basis of Design is Corian by Dupont. (CONTRACTOR WILL NEED TO MATCH COLOR OF SURFACE AND BOWL AS NOTED ON THE DRAWINGS FOR OTHER MANUFACTURER'S) see AF712

1. Corian® by DuPont; www.corian.com
2. Samsung Chemical USA; www.staron.com
3. Wilsonart Contract; www.wilsonartcontract.com

B. Performance Criteria:

1. Solid Surface Based Products:

a.	Tensile Strength	6000 psi min	ASTM D638
b.	Tensile Modulus	1.5×10^6 psi min	ASTM D638
c.	Tensile Elongation	0.4% min.	ASTM D638
d.	Flexural Strength	10000 psi min	ASTM D790
e.	Flexural Modulus	1.2×10^6 psi min	ASTM D790
f.	Hardness	>85-Rockwell "M" scale min.	ASTM D785
g.	Thermal Expansion	2.2×10^{-5} in./in./°F	ASTM E228
h.	Fungi and Bacteria	Does not support microbial growth	ASTM G21 & G22
i.	Microbial Resistance	Highly resistant to mold growth	UL 2824
j.	Ball Impact	No fracture - 1/2 lb. Ball: 6 mm slab - 36" drop 12 mm slab - 144" drop	NEMA LD 3, Method 3.8
k.	Weatherability	$\Delta E^*94<5$ in 1,000 hrs	ASTM G155
l.	Flammability	ASTM E84, NFPA 255 & UL 723	

All Colors

		6 mm	**12 mm**	
m.	Flame Spread	<25	<25	
n.	Smoke Developed	<25	<25	
o.	Class	A	A	Florida Fire Protection Code, NFPA 101®, Life Safety Code

C. Fire Hazard Ratings:

1. Classified in accordance local codes and ordinances, ASTM E84 and the following:

   a. Class A
   b. Flame Spread: 0 – 25
   c. Smoke Developed: 0-450

D. Lavatory Countertops with intrigral lav and Baby Changing Stations:

1. Homogeneous cast polymer countertops. Thickness, sizes and profiles as shown on Drawings.

   a. Provide matching backsplash, side splash, aprons, shelves, integral bowl, and other accessories as shown on Drawings and specification in same material, color and finish as countertops except for color of Bowls.
   b. Color as noted on the drawings.

2. Separate Lavatory Bowls, As noted on drawings, if not noted Corian Model #820, Color as noted on the drawings or if not noted on drawings to be selected by Architect.

E. Accessories

1. Hafele or approved equal heavy duty side wall mounted, manual full extension ball bearing over travel slides.
2. Custom fabricated S.S. waste basket.
3. Custom fabricated S.S. time/sleeve at top of counter top for waste.
4. Cam locks for face access panel and waste receptacles.

2.2 INSTALLATION MATERIALS

A. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or stainless steel anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

B. Sink/Lavatory Mounting Hardware: Manufacturer's standard bowl clips, panel

inserts and fasteners for attachment of undermount sinks/lavatories.

C. Adhesive and Sealant: As recommended by cast polymer manufacturer.

1. Use products that are approved by Cast polymer materials Manufacturer and as directed for type of installation.

2.3 FABRICATION

A. General:

1. Shop assemble cast polymer materials for delivery to Site in units easily handled and to permit passage through building openings.
2. Shop cut openings, to maximum extent possible, to receive hardware, accessories, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings.

   a. Rout and finish component edges with clean, sharp returns. Rout cutouts, radii and contours to template. Smooth edges. Repair or reject defective and inaccurate work.

3. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trip for scribing and site cutting.
4. Provide cutouts for plumbing fixtures, inserts, appliances, outlet boxes, accessories, control and other fixtures and fittings.
5. Provide for mounting of accessories indicated on the Drawings and Specification.
6. Edge treatment as indicated on drawings, or radius corners.

PART 3 - EXECUTION

3.1 INSPECTION

A. Verify adequacy of backing and support framing. Do not start installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Condition cast polymer materials to average prevailing humidity conditions in installation areas a minimum of 24 hours before installation.

3.3 INSTALLATION

A. All countertops, baby changer and accessories shall be installed as shown on Drawings and as specified. Follow manufacturers installation instructions.

B. Install components plumb, level and rigid, scribed to adjacent finishes, in

accordance with final Shop Drawings and product data.

C. Adhere sinks and lavatory bowls to tops using manufacturer's recommended sealant, adhesive and mounting hardware. Wipe clean with denatured alcohol to remove any contaminants prior to applying adhesives.

D. Countertops and Baby Changing Stations:

1. Quality Standard: Comply with AWI Section 400 requirements for countertops.
2. Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
3. Install countertops with no more than 1/8 inch in 96 inch sag, bow, or other variation from a straight line.
4. Provide cutouts for the installation of plumbing fixtures.
5. Provide backsplashes, sidesplashes, and aprons as indicated on the Drawings. Adhere to tops using manufacturer's standard color-matched silicone sealant.

E. Waste receptacles:

1. Provide a solid surface face on waste receptacle drawer.
2. Skin exterior of drawer frame with 28 GA S.S.
3. Waste basket constructed of 22GA S.S. full welded joints polished smooth.
4. Install S.S. trim at counter circular cut out for dropping waste paper.

F. Integral sinks/vanities:

1. Provide solid surface materials bowls and/or lavatories sinks with overflows in locations shown on the drawings.

2. Secure lavatory bowls to tops using manufacturer's recommended sealant, adhesive and mounting hardware to maintain warranty.

3.4 ADJUSTING AND CLEANING

A. Keep components clean during installation. Remove adhesives, sealants and other stains. Keep clean until Date of Substantial Completion. Replace stained and damaged components.

B. Protect surfaces from damage until Date of Substantial Completion. Repair work or replace damaged work which cannot be repaired to Owner's Representative's satisfaction.

END OF SECTION 06 60 16

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SECTION 07 21 00 - THERMAL INSULATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements, apply to the work specified in this Section.

1.02 DESCRIPTION OF WORK

A. The extent of thermal insulation work is shown on the drawings, by the generic name of by its abbreviation. The applications of thermal insulation specified in this Section include the following:

1. Loose cavity wall insulation.
2. Batt-type building insulation.
3. Foam cavity wall insulation.
4. Semi-rigid board insulation.
5. Mineral wool blanket sound attenuation.
6. Fire batt insulation.

1.03 QUALITY ASSURANCE

A. Thermal Conductivity:

B. Fire and Insurance Ratings:

1.04 SUBMITTALS

A. (SD-01)(SD-02) Manufacturer's Data, Thermal Insulation:

1.05 PRODUCT HANDLING

A. Protection from Deterioration:

1.06 JOB CONDITIONS

A. Examination of Substrates:

PART 2 PRODUCTS

2.01 MATERIALS

A. Loose Granular Perlite Insulation: Expand aggregate; FS HH-I-574; k-value of 0.37; treated with silicone for water-repellency where used in exterior wall construction.

B. Loose Granular Vermiculite Insulation: Exfoliated micaceous aggregate; FS HH-I-585, Type I or II; k-value of 0.50; treated for water-repellency where used in exterior wall construction.

C. Mineral/Glass Fiber Blanket/Batt Insulation: Inorganic fibers formed into flexible resilient blankets or semi-rigid resilient sheets: ASTM C665 Type I and ASTM E136: Density as indicated, but 1.0 lb. minimum; k-value of 0.27 where thickness is indicated, or k-value and thickness as required to provide "R" value as indicated. Manufacturer's standard lengths and widths as required to coordinate with spaces to be insulated:

1. Certain Teed – Thermal Batt Insulation unfaced.
2. Johns-Manville – Thermal Batt Insulation unfaced.
3. Owens-Corning – Thermal Batt Insulation unfaced.

D. Foam Insulation: Basis of Design. Core-Fill 500 foam insulation, 60 lbs. density developing a "R" value for 8" CMU of 14.2 and a "U" value of 0.07. Flame spread not to exceed 25. Smoke developed of not more than 450 as per ASTM E84. As manufactured by Tailored Chemical Products.

1. Other acceptable manufacturers subject to compliance with requirements, products may be incorporated in the work include, but are not limit to the following.
   a. Air Krete, Inc., Weed Sport, NY
   b. Thermco, Mt. Pleasant, Idaho

E. Miner/glass fiber board insulation inorganic fibers with a thermosetting resin binder into semi-rigid boards: ASTM C612, type IA and IB: Density as indicated, 3.0 PCF; K-value 23. Owens-Corning type 703, unfaced, or approved substitution.

F. Mineral Wool Blanket/Batt Insulation: Inorganic fibers formed into flexible resilient blankets. Classified non-combustible ASTM E136, ASTM C665, Type I sound attenuation fire batt insulation/MW/mineral wool. Owens-Corning, sound attenuation fire batt insulation/mineral wool, or approved substitution.

2.02 MISCELLANEOUS MATERIALS

A. Bronze/Stainless-Steel Screen.

B. Mechanical Anchors: Type and size shown or, if not shown, as recommended by insulation manufacturer for type of application, condition of substrate and cavity.

C. Grout

D. Galvanized expanded wire.

PART 3 EXECUTION

3.01 PREPARATION OF SUBSTRATE

A. Provide bronze/stainless-steel screen (inside) where openings must be maintained for drainage or ventilation.

3.02 INSTALLATION

A. General: Comply with manufacturer's instructions for the particular conditions of installation in each case. If printed instructions are not available, or do not apply to the project conditions, consult the manufacturer's technical representative for specific recommendations before proceeding with the work. Do not install insulation in wet conditions.

B. Cavity-Wall and Masonry-Cell Insulation: Pour granular insulation into cavities as shown, to completely fill the void spaces. Maintain inspection ports to show presence of insulation at the extremities of each pour area. Close ports after complete coverage has been confirmed. Limit fall of insulation to one story in height, but not to exceed 20'-0".

C. Extend insulation full thickness as shown over entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

D. Apply a single layer of insulation of the required thickness, unless otherwise shown or required to make up the total thickness.

E. Install foam product following the manufacturer’s recommendations for mixing, installing, and curing.

F. Install board insulation creating a continuous layer of insulation.

3.03 GENERAL BUILDING INSULATION

A. Pour granular insulation into spaces and onto surfaces as shown. Screed horizontal applications to uniform thicknesses indicated.

B. Provide either perlite or vermiculite into miscellaneous voids and cavity spaces as indicated. Compact to approximately 40% of normal maximum volume to a density of approximately 2.5 lbs. per cubic foot.

C. Protect voids and cavities for concrete cells, columns, lintels, bond beam, and concrete beam forms free of insulation material. Clean completely of any loose fill insulation.

D. Apply insulation units to the substrate by the method indicated, complying with the manufacturer’s recommendations. If no specific method is indicated, bond units to substrate with mechanical anchorage to provide permanent placement and support of units.

E. Stuff loose mineral fiber insulation into miscellaneous voids and cavity spaces as indicated. Compact to approximately 40% of normal maximum volume to a density of approximately 2.5 lbs. per cubic foot.

F. Install Galvanized wire support over mineral fiber insulation on exposed installations horizontally on vertical between supports.

END OF SECTION 07 21 00

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SECTION 07 22 16 - ROOF BOARD INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes provisions and procedures governing the furnishing and installation of a roof insulation assembly incorporated into the work.

1.2 RELATED SECTIONS

A. Section 05 31 00 Steel Decking

B. Section 06 10 00 Rough Carpentry.

C. Section 07 54 19 Thermoplastic Membrane Roofing.

D. Division 22 Plumbing

E. Division 23 Mechanical

1.3 SYSTEM DESCRIPTION

A. Tapered roof insulation assembly shall consist of a combination of flat and tapered panels, for crickets, half-crickets, and saddles as required, to provide for the NRCA “positive drainage” of the roof at a minimum of 1/4 foot and 1/2 foot at crickets.

1.4 QUALITY ASSURANCE

A. Provide primary products by a single manufacturer, which has produced that type of product successfully for not less than five (5) years. Provide secondary products only as recommended by manufacturer of primary products for use with roofing system specified.

B. A single Installer (“Roofer”) shall perform the work of the section, and shall be a firm with not less than five (5) years of successful experience of installation of insulation systems similar to those required for this project and which is certified acceptable to or licensed by manufacturer of primary roofing materials.

C. Maintain a full-time supervisor/foreman, not a foreman/workman on the roof during times that tapered insulation assembly work is in progress and shall not be employed on any other project during the course of this project and shall not be changed without approval of the Architect.

D. All roofing materials shall be labeled Class A per ASTM E 108, and shall be certified by a nationally recognized independent testing laboratory.

E. Provide professional engineering services as required to assure engineering responsibility for the preparation of roofing system submittals based on testing and engineering analysis of the manufacturer's roof system in assemblies similar to those indicated on the project.
   1. The Architect shall be entitled to rely upon such submittals and analysis to establish the materials and systems shall meet the requirements of the Contract Documents.

F. Provide Florida product approval and/or notice of acceptance for proposed product in addition to requirement set forth in paragraph E above.

1.5 SUBMITTALS

A. (SD-01)(SD-02) Product Data: Submit manufacturer's technical product data, installation instructions and recommendations for each type of insulation product required. Include data substantiating that materials comply with requirements.

B. (SD-04)(SD-05) Shop Drawings
   1. Submit manufacturer's shop drawings indicating insulation layout, cross section of assembly, and minimum board dimensions.
      a. Submit drawings indicating slope, ridges and valleys to achieve NRCA "positive drainage".
      b. Submit calculations certifying that insulation layout provides the R factor specified for each roof area.
   2. Wind Load Drawings: Using the project drawings, submit Red-Lined drawings as required indicating roof system modification for wind load resistance with special emphasis on the following.
      a. Information related to wind loads including basic wind speed, wind importance factor, wind exposure, and applicable internal pressure coefficient.
      b. Wind load uplift pressures and dimensions of edge corner and field zones shall be shown for each roof area
      c. Type/Manufacturer of fastener and fastening pattern for each zone shall be shown for each roof area based upon same type, manufacturer roof fastener withdrawal resistance test results.
      d. Design calculations based on Florida Building Code latest edition.
      e. All drawings and support documentation shall be signed and sealed by a Florida Professional Engineer.
   3. Insulation Fastener Withdrawal Resistance Testing: Submit Withdrawal resistance test report in accordance with the Florida Building Code; Testing Application Standard (TAS) 117(A)95.
      a. Test one (1) fastener per 5,000 square feet with a minimum of three (3) fasteners per substrate type per roof area.
   4. Provide signed and sealed calculation design drawings prepared by a Florida Professional Engineer.

C. (SD-15) Samples; Insulation Materials: Submit three (3) twelve (12) inch square samples of each component of insulation assembly.

D. (SD-15) Samples; Fasteners: Submit three (3) samples of each fastener type.

E. (SD-09) Installer: Submit supervisor/foreman's resume.

F. (SD-13) Provide copies of Florida Product Approval.

1.6 JOB CONDITIONS

A. Weather Condition Limitations: Proceed with insulation work only when existing and forecasted weather conditions will permit work to be performed in accordance with manufacturer's recommendations and warranty requirements.

B. Wet Insulation: Roofing system(s) shall not be applied over wet insulation. Installed insulation which has become wet will be removed and replaced with dry material. Insulation which has become wet prior to installation shall not be installed in the work, and shall be removed from the project site. The definition of "wet shall be the moisture content determined to be in excess of NRCA Equilibrium Moisture Content".

1.7 PRODUCT HANDLING

A. Procedures in accordance with Section 01 60 00.

B. Deliver material in manufacturers original, unopened containers, with manufacturers labels intact and legible.

C. Deliver material requiring fire resistance classification to the job with the label attached and packaged as required by labeling service.

D. Deliver enough material to allow continuous work.

E. Store and handle roof insulation materials in a manner which will ensure that there is no possibility of moisture pick up. Store in a dry, well ventilated weather tight place or store properly protected by leak proof coverings or manufacturers original unopened containers. Do not leave unused materials on the roof overnight or when roofing work is not in progress without proper weather tight protection.

F. Store insulation on pallets or other raised surface. Handle and store materials or equipment in a manner not to exceed design live loads, and to avoid significant or permanent deflection of deck. The installer is responsible for any structural damage occurring due to the storage of materials or equipment on the roof.

G. Storage on newly installed membrane is not permitted.

1.8 WARRANTY

A. Insulation/Roofing Manufacturer's System Warranty: Manufacturer's standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of insulation system, flashing system, copping system and membrane roofing system that fail in materials, workmanship, or items identified not in conformance with the project documents within specified warranty period as a wraparound warranty. Failure includes roof leaks.

1. Special warranty includes recovery board, roof insulation boards, flashing, curbs, copping and roofing membrane, base flashings, roofing membrane accessories, walkway products and other components of membrane roofing system.
2. Warranty Period: 20 years from date of Substantial Completion.
3. Special Warranty Rider: Coverage for winds up to and including **120** mph (3-second gust).
4. Provide a warranty for building and square footage.

B. Installer Warranty: Including all components of roofing system such as recovery board, insulation board, flashing, curbs, copping and roofing membrane, base flashing, fasteners, and walkway products.
1. Warranty Period: Two (2) years from date of Substantial Completion.
2. Provide warranties for building and square footage’
3. During the warranty period, upon notification by VPS, the Installer must be on site within 24 hours to make necessary permanent or temporary repairs. Should the Installer fail to make such repairs within the time period, VPS may have the repairs made and charge the cost to the Installer; such repairs by VPS shall not void the system warranty. Emergency repairs required reasonably and immediately to protect life or property shall not void this warranty. Installer roof access shall not be unreasonably denied. Delay of construction contract payment by General Contractor shall not be cause to withhold warranty performance.

C. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, including all components of membrane roofing system such as recovery board, insulation board, curbs, flashing, copping, roofing membrane, base flashing, fasteners, and walkway products, for the following warranty period:

1. Warranty Period: Two years from date of Substantial Completion.

D. Special Warranty Requirements: Provide separate warranties for building and square footage. The work will require the original roofing warranty to be maintained current. Written acknowledgement by the original roof installer and manufacturer. That the work in place complies with warranty requirements for continuity of warranty and will include work installed.

E. Maintenance Data: For roofing system to include in maintenance manuals.
1. Comply with requirements in Section 01 78 00 “Closeout Procedures”.
2. Procedure and instructions

a. Include a set of instructions detailing preventative maintenance and noting a list of harmful substances which may damage installation.
b. Include procedures for exercising warranty and guarantee provisions, leak calls, temporary repairs and future modifications to roof system

3. Copies of as-built roofing details.
4. Roof plan indicating penetrations, detail locations, roof drains, and seams.
5. Copy of SPRI/NRCA "Manual of Roof Inspection, Maintenance and Emergency Repair for Existing Single-Ply Roofing Systems".
6. FBC Compliance: Contractor's final statement of compliance.
7. Inspection reports: Copy of all roofing system manufacturer's inspection reports of roofing installation shall be submitted for review by the Designer and forwarded to the Owner. Submit separate reports to Owner Designer for building not to exceed 20,000 sg ft per report per inspection by the Manufacturer's Representative.

PART 2- PRODUCTS

2.1 INSULATION ASSEMBLY: The drawings are based on a multi-layer, multi-material insulation assembly, mechanically fastened. Multiple layers may be drawn as a single layer regardless of layers required. Minor deviations will be acceptable, and/or use manufacturer's standard products, when in the Architects sole judgement, such deviations do not detract from design concept or intended performance.

A. Polyisocyanurate Board Insulation; Rigid cellular polyisocyanurate thermal insulation with core formed by using HCFC's as blowing agents complying with ASTM C1289, Type II, UL Classification: Class A, minimum 1.4 inches, maximum 2.0 inch thickness, and four (4) foot by eight (8) foot boards.

1. Insulation Board; The min roof insulation is R-25 across entire roof. See drawings.

B. Edge Strips: Rigid units if required by the Thermal Plastic Roofing Membrane manufacturer and compatible with system, tapered to sizes and shapes shown on the drawings.

C. Cants: four (4) inch vertical height and 45 degree face, full depth, pre-formed units, unless otherwise shown, of rigid units complying with thermal single ply roofing system manufacturer requirement for product compatibility and system warranty.

D. Base Board: Georgia-Pacific, DensDeck Prime 5/8 inch thick, mechanically fasten to steel deck.

D. Cover Board: Georgia- Pacific, DensDeck Prime 5/8 inch thick, Adhered to insulation board.

2.2 FASTENERS

A. For Fastening Roof Insulation to Deck

1. Roofing system manufacturer's recommended insulation fastener based on roof type/ manufacturer fastener withdrawal resistance testing and submitted signed and sealed shopdrawings.
2. Roofing system manufacturer's recommended insulation fastener shall be corrosion resistant meeting ASTM A641, Class 1 or equally corrosion resistant by coating etched galvanization, mechanical galvanization, hot dipped galvanization, stainless steel, nonferrous metal or other suitable corrosion resistant material.
3. Roofing deck fastener to existing deck with "OLYLOK" locking impact nail, galvanized (G-90), disk galvanized (AZ-55), locking staple: High tensile coated wire.

2.3 ADHESIVES

A. For Fastening Roof cover board to top of insulation.

1. Roofing system manufacturer's recommended adhesive based on roof type Insulation board and delamination resistance to resist applied wind loads

2. ADHESIVES: Shall meet minimum roofing system design requirements as evidence by testing in conjunction with proposed substrates and/or composite acceptable third party laboratory.

a. ADHESIVES: Shall be pre-authorized by roofing manufacturer.

3.1 GENERAL INSTALLATION REQUIREMENTS

A. In addition to the specified procedures, the installer shall be responsible for the installation of the tapered insulation assembly in accordance with the procedures required by the roofing material manufacturer for the proper execution of the work and assurance of the warranty.

B. The installer shall review the specified procedures for possible conflicts, prior to bidding for resolution.

3.2 FASTENER INSTALLATION REQUIREMENTS

A. Install fasteners in accordance with manufacturer's directions.

B. Fasteners shall be driven perpendicular to deck with proper length for fastening into deck, and to achieve required pull-out resistance.

C. All improperly installed fasteners shall be removed. Improper applications shall be characterized as:

1. Over driven to the point that the fastener is causing the stress plate to become concave or deformed.
2. Under driven to the point that the fastener head is not properly seated on the stress plate.

3. Broken or snapped under the driving load.
4. Bent due to improper installation.
5. Not engaged, due to improper locations or insufficient length.

3.3 INSPECTION

A. Examine substrates and conditions over which the tapered insulation assembly work is to be performed, and notify the Architect in writing of unsatisfactory conditions.

B. Do not proceed with the insulation assembly work until unsatisfactory conditions have been corrected in a manner acceptable to the installer.

C. Inspect existing curbs and nailers for damage or deterioration. Immediately notify the Architect of any defects.

D. When additional new installers are required, and when replacement items are required, verify that the new curbs and nailers are in place and properly installed.

E. Verify that curbs, vent stacks, and other roof fixtures have been raised in height as required for height of new roof membrane.

3.4 INSULATION ASSEMBLY MECHANICALLY FASTENED

A. Apply only as much insulation and cover board as can be completely covered with the roofing membrane in the same day.

B. Each layer of insulation shall be applied in parallel courses with long joint continuous and with cross joints broken. Tightly butt all edges, with no gaps exceeding ¼ inch. Do not force fit the insulation. Grind smooth all unevenness between edges.

1. Succeeding layers of boards shall be offset a minimum of twelve (12) inches from the preceding layer of boards.

C. Insulation edges at vertical surfaces and penetrations shall be trimmed a maximum of ¼ inch from the surface.

D. Apply one (1) layer of cover board over the entire surface of the taper insulation.

1. Apply a layer of cover and base board in parallel courses with long joints continuous and cross joints broken.
2. Tightly butt all edges with no gaps exceeding ¼ inch. Do not force fit the cover board.
3. Offset cover board joints a minimum of twelve (12) inches from taper board joints.

4. Cover board edges at vertical surfaces and penetrations shall be trimmed a maximum of ¼ inch from the surface.

E. Mechanically fasten the insulation assembly to the existing deck in accordance with approved wind load drawings.

3.5 EDGE STRIP INSTALLATION MECHANICALLY FASTENED

A. Install edge strips at roof drains to form a sump around the roof drain to provide a smooth transition from the tapered insulation assembly to drain clamp ring and to achieve NRCA “positive drainage”.

B. Install edge strips as shown on the drawings. Grind smooth all unevenness between strips to develop slope to achieve NRCA “positive drainage”.

C. Mechanically fasten edge strips to deck as follows:
1. Quantity, size and spacing per Engineered Shop drawings.

3.6 CANT STRIPS MECHANICALLY FASTENED

A. Install cant strips as shown on drawings.

B. Install cant strips in a 1/8 inch thick bead of roof cement and mechanically fasten to the deck as follows:
1. Quantity, size and spacing per Engineered Shop drawings.

3.7 PROTECTION OF INSULATION

A. Installer shall repair or replace deteriorated or defective work as directed by the architect.

B. Work will be coordinated as to severely limit the amount of roof-top traffic over completed insulation assembly areas.

END OF SECTION 07 22 16

SECTION 07 26 16 - BELOW GRADE VAPOR BARRIER

PART 1 GENERAL

1.01 SUMMARY

A. Products supplied under this section:

1. Vapor barrier and installation accessories for installation under concrete slabs, thickened slabs and foundations.

B. Related sections:

1. General conditions and supplemental conditions to the contract.
2. Section 03 30 00 Cast-in-Place Concrete.
3. Section 31 31 16 Termite Control.

1.02 REFERENCES

A. American Society for Testing and Materials (ASTM):

1. ASTM E1745- 11Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
2. ASTM E1643- 11Selection, Design, Installation, and Inspection of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.

B. Technical Reference - American Concrete Institute (ACI):

1. ACI 302.2R-06 Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials.

1.03 SUBMITTALS

A. (SD-10) Test Reports: Summary of test results per paragraph 9.3 of ASTM E 1745.

B. (SD-15) Sample/Product Data: Manufacturer’s samples and literature.

C. (SD-01)(SD-02) Manufacturer’s installation instructions for placement, seaming and penetration repair instructions.

D. (SD-10) All mandatory ASTM E1745 testing must be performed on a single production roll per ASTM E1745 Section 8.1.

PART 2 PRODUCTS

2.01 MATERIALS

i. Vapor barrier shall have all of the following qualities:

1. Maintain permeance of less than 0.01 Perms [grains/(ft2 · hr · inHg)] as tested in accordance with mandatory conditioning tests per ASTM E1745 Section 7.1 (7.1.1-7.1.5).
2. Other performance criteria:
   a. Strength: ASTM E1745 Class A.
   b. Thickness: 15 mils minimum

ii. Vapor barrier products:

1. Basis of Design: Stego Wrap Vapor Barrier (15-mil) by Stego Industries LLC., (877) 464-7834 www.stegoindustries.com.
2. Approved products meeting all performance and submittal requirements.

2.02 ACCESSORIES

A. Seams:

1. Stego Tape by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.

B. Penetrations of Vapor barrier:

1. Stego Mastic by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
2. Stego Tape by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.

C. Perimeter/edge seal:

1. Stego Crete Claw by Stego Industries LLC, (887) 464-7834 www.stegoindustries.com.
2. StegoTack Tape (double sided) by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.
3. Stego Term Bar by Stego Industries LLC, (877) 464-7834 www.stegoindustries.com.

PART 3 EXECUTION

3.01 PREPARATION

A. Ensure that subsoil is approved by Architect, Structural Engineer, or Geotechnical Engineer.

1. Level and compact base material.

3.02 INSTALLATION

A. Install vapor barrier in accordance ASTM E1643.

1. Unroll vapor barrier with the longest dimension parallel with the direction of the concrete placement and face laps away from the expected direction of the placement whenever possible.
2. Extend vapor barrier under footings thickened edge and grade beams to a distance acceptable to the structural engineer or stop at impediments such as dowels and waterstops.
3. Seal vapor barrier to slab perimeter/edge using Stego Crete Claw and remove dirt, debris, and mud from Crete Claw prior to concrete placement.
4. Overlap joints 6 inches and seal with manufacturer’s tape.
5. Apply tape/Crete Claw to a clean and dry vapor barrier.
6. Seal all penetrations (including pipes) per manufacturer’s instructions.
7. No penetration of the vapor barrier is allowed except for reinforcing steel and permanent utilities. Seal penetration per manufacturer installation instructions.
8. Repair damaged areas by cutting patches of vapor barrier, overlapping damaged area 6 inches and taping all sides with tape.

END OF SECTION 07 26 16

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SECTION 07 27 10 - FIRE STOPPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Fire stopping shall include sealing (fire stopping) all existing and proposed openings, spaces and penetrations through fire and smoke barriers including floors, walls, partitions, and decks.

B. Seal floor-to-floor, floor-ceiling, and ceiling-roof penetrations openings and passages.

C. Seal proposed and existing pipes, conduits, wiring, sleeves, ducts, and other utilities that penetrate fire-rated walls, partitions, ceilings, and floors.

D. Specifically all VPS Electrical and Communication rooms to include their walls, ceiling and floor shall be protected to achieve the minimum fire resistance rating. Walls-1 hour, and ceiling/roof 1 (One) hours or as noted on the drawings or as noted on existing walls.

E. Specifically all airport facility spaces to include existing walls, ceilings, floors and roof which are labeled as rated per existing conditions, proposed work and requirement due to construction type classification with floor penetration having a minimum 2 (Two) hour resistance rating, and roof with a minimum of 1 (One) hour resistance rating.

1.2 REFERENCE STANDARDS

A. The latest edition of publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) AND (ANSI) CODE REFERENCES

1. ASTM E84 — Surface Burning Characteristics of Building Materials.
2. ASTM E814 — Tests of Through-Penetration Fire Stops.
3. ASTM E119 — Standard Test Methods for Fire Tests of Building Construction and Materials.
4. ASTM E2174 — Standard Practice for On-Site inspection of Installed Fire stops.
5. ANSI/UL 263 — Fire Tests of Building Construction and Materials.
6. ANSI/UL 723 — Surface Burning Characteristics of Building Materials.

7. ANSI/UL 1479 — Standard for Fire Tests of Through Penetration Fire stops.

B. All materials used shall be tested in accordance with ASTM E814. Each system used for fire stopping shall be tested, approved and listed by U.L. or other approved testing agency. The rating of the fire stopping system shall provide the same or greater hourly fire rating as that of the fire barrier through which it is penetrating and sealed.

C. U.L. Test: ASTM E814 Fire Tests of Through-Penetration Fire Stops.

D. Provide products that are compatible with each other and by the same manufacture.

1.3 SUBMITTALS (SD-01, 02 & SD-10)

A. Provide (1) electronic copy of submittals via established drop box or equivalent per A/E's instructions. All copies to be in PDF & DWF formats with the only other exception being signed docs.

B. Manufacturer's Product Data: SD-01; Submit descriptive technical data and installation instructions for each material and product.

C. Test Report: SD-10; Submit scaled details and fire stopping test report from UL or other testing agency for each fire stopping system to be used as requested by the A/E.

D. See 3.1.A for required field product review as part of submittal product approval. All applicable trades shall participate.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility for FIRESTOPING: For the entire project, obtain materials and UL systems for all penetrations from the same manufacturer. Deviation from this requirement or use of multiple manufacturers will not be permitted.

B. Application of firestoping shall be performed by a Manufacturer authorized applicator with a minimum of 3 years' experience.

PART 2 - PRODUCTS

2.1 FIRESTOPPING

A. For specific components and accessories for the fire stop systems and as required by the UL Design Test Report, see Drawings Details.

B. If field conditions require detail system not shown on Drawing Details provide a UL system as manufactured by:

1. 3M Company, Fire Protection System (Basis of Design)
2. Hilti Fire stop
3. STI, Specified Technologies, Inc.

C. Materials shall have been tested in accordance with ASTM E814 or UL 1479, the Standard Method of Fire Tests of Through Penetration Fire stops, or equivalent.

D. System design shall provide a fire-resistance rating equal to or exceeding the fire-resistance rating of the floor or wall construction being penetrated.

E. Materials shall be water-resistant and shall be insoluble in water when cured.

F. Materials shall be compatible with all materials used in the construction. Solvent-based materials shall not be used.

G. Installations subject to movement or vibration shall be sealed with materials designed to perform under these conditions.

I. Basis of Design 3M product types and applications. Approved equals by a single source manufacture may be submitted for acceptance.

A. 3M FireDam Spray 200: Product is recommended for large areas for fast coverage for perimeter joints, construction joints and abutting materials such as wall to ceiling joints.
1. Fire Resistance: For use in 1, 2, 3 or 4 hour fire-rated systems.
2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

B. 3M Fire Barrier Ultra RC Pack: One piece metal collar assembly encasing intumescent material for fire stopping of pipes and cables through rated walls and floors.
1. Fire Resistance: For use in 1 or 2 hour fire-rated systems.
2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

C. 3M Fire Barrier Ultra Plastic Pipe Device: Intumescent device for fire stopping of plastic pipe and cables through rated walls and floors.
1. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems.
2. Configuration: One-piece metal collar, with locking latch and bendable tabs to secure; equipped also for conventional anchoring.
3. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

D. 3M Fire Barrier RC-1 Restricting Collar with either FS 195+ Wrap Strip or 3M Interam Ultra GS Wrap Strip . (See product descriptions below): For fire stopping of plastic pipes from 4 inches (102 mm) to 10 inches (254mm) in diameter.

1. Fire Resistance: For use in 1or 2 hour fire-rated systems.
2. Material: 28 gauge steel.
3. Size: 25 foot (7.6 m) roll.
4. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

E. 3M Fire Barrier CP25WB+ Sealant: High-performance, intumescent, water-based sealant. No-sag, fast drying, paintable, red in color. Versatile fire stops sealant for pipes (not for use with CPVC), cables, cable tray, blank opening and other penetrations along with mineral wool or other fire-rated assembly products.
1. Fire Resistance: For use in 1, 2, 3 or 4 hour fire-rated systems.
2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.
3. STC rating of 54 when tested in STC 54-rated wall assembly.

F. 3M Fire Barrier IC 15WB+ Sealant: General-purpose, intumescent, water-based sealant. No-sag, fast drying, paintable, yellow in color. Economical fire stop sealant for
pipes, cables, cable tray, blank opening and other penetrations along with mineral wool or other fire-rated assembly products.
1. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems.
2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.
3. STC rating of 54 when tested in STC 54-rated wall assembly.

G. 3M Fire Barrier Sealant FD 150+: Single-part, water-based, acrylic latex sealant. No-sag, low-shrinkage, low VOC. Blue, red or limestone color. Used to fire stop for pipe penetrations (not for use with CPVC).
1. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems.
2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.
3. STC rating of 54 when tested in STC 54-rated wall assembly.

H. 3M Fire Barrier Water Tight Sealant 3000 WT: Single-part, water-tight, intumescent silicone fire stop sealant for filling voids in concrete gypsum, metal, plastic, wood and insulation. Light gray color with black flecks. Meets UL Water Leakage Test, W Rating – Class 1 requirements.
1. Fire Resistance: For use in 1, 2, 3 or 4 hour fire-rated systems.
2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.
3. STC rating of 53 when tested in STC 54-rated wall assembly.

I. 3M Fire Barrier Water Tight 1000 NS Sealant: Single-part, non-slump fire stopping silicone sealant for floor and wall openings. Light gray color. Meets UL Water Leakage Test, W Rating – Class 1 requirements.
1. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems.
2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.
3. STC rating of 56 when tested in STC 56-rated wall assembly.

J. 3M Fire Barrier Water Tight Sealant 1003 SL: Single-part, self-leveling fire stopping silicone sealant for floor openings. Light gray color. Meets UL Water Leakage Test, W Rating – Class 1 requirements.
1. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems.

2. Locations: For horizontal assemblies only.
3. STC rating of 56 when tested in STC 56-rated wall assembly.

K. 3M Fire Barrier Sealant 2000 NS: Single-part, non-slump elastomeric silicone fire stop sealant. Sag-resistant, low VOC. Light grey color. Used in mechanical, electrical and plumbing applications to fire stop openings and penetrations through fire-rated floor or wall assemblies. Typical penetrants include: metallic pipe, non-metallic pipe (FGG/BM system CPVC compatible), conduit, power and communication cable and telephone or electrical wiring.
1. Fire Resistance: For use in 1, 2, 3 or 4 hour fire-rated systems.
2. Locations: Vertical and horizontal assemblies.
3. STC-Rating of 56 when tested in STC 56-rated wall assembly.

L. 3M Fire Barrier Sealant 2000+: Single-part, elastomeric silicone fire stops sealant. Sag- resistant, low VOC. Light grey color. Used in mechanical, electrical and plumbing applications to fire stop openings and penetrations through fire-rated floor or wall assemblies. Typical penetrants include: metallic pipe, non-metallic pipe (FGG/BM system CPVC compatible), conduit, power and communication cable and telephone or electrical wiring.
1. Fire Resistance: For use in 1, 2, 3 or 4 hour fire-rated systems.
2. Locations: Vertical and horizontal assemblies.
3. STC-Rating of 56 when tested in STC 56-rated wall assembly.

M. 3M Fire Barrier Moldable Putty+: One-part, 100 percent solids intumescent fire stop.
Remains pliable, flexible and easily re-enterable. Non-toxic synthetic formula. Versatile putty for pipes, cables, cable tray, blank opening and other penetrations along with mineral wool or other fire-rated assembly products.
1. Type: Stick or Pad
2. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems.
3. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

N. 3M Fire Barrier 2001 Silicone RTV Foam: Two-part, liquid-silicone elastomer, foams in place when mixed. For use sealing large or complex openings such as cable bundles, cable trays and conduit banks.
1. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems.
2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

O. 3M Fire Barrier Mortar: For sealing openings in concrete and masonry walls and floors.
Self-Leveling, non-sag, low VOC.
1. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems.
2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

P. 3M Fire Barrier Self-Locking Pillow: Self-contained, intumescent fire stop pillow with interlocking strips. Meets fire rating without the use of wire mesh. For use in fire stopping larger openings
1. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems.

2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

Q. 3M Fire Barrier Pillow: Self-contained, intumescent fire stop product. Meets fire rating without the use of wire mesh. For use in fire stopping larger openings
1. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems.
2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

R. 3M Fire Barrier CS-195+ Composite Sheet: Organic/inorganic intumescent elastomeric sheet, bonded on one side to a layer of 28 gauge galvanized steel. Other side reinforced with steel-wire mesh and covered with aluminum foil. Re-enterable. For use in fire stopping larger openings
1. Thickness: Nominal 0.3 inch (7.6 mm).
2. Thermal Expansion: 8 - 10 times original size.
3. Tensile Strength (ASTM D412): 93.6 psi (645 kPa)/489 percent.
4. Fire Resistance: For use in 1, 2, 3 or 4 hour fire-rated systems.
5. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

S. 3M Interam Ultra GS Wrap Strip: Graphite based, flexible, largely inorganic, intumescent mat. For use around non-metallic piping with or with RC-1 collar.
1. Fire Resistance: For use in 1, 2 or 3 hour fire rated systems.
2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

T. 3M Fire Barrier FS-195+ Wrap/Strip: One-part, organic/inorganic intumescent strip with foil on one side. May be cut to fit irregular shapes. For use around non-metallic piping with or with RC-1 collar.
1. Length: 24 inch (610 mm).
2. Width: 1 or 2 inches.
3. Fire Resistance: For use in 1, 2, 3 or 4 hour fire-rated systems.
4. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

U. 3M Fire Barrier Pass-Through Devices: One-Piece device for fire stopping of cable penetrations through rated walls and floors.
1. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems.
2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

V. 3M Fire Barrier Tuck-In: Graphite-based, flexible, intumescent wrap strip for use around non-metallic piping. Adhesive closure tab.
1. Fire Resistance: For use in 1, 2 or 3 hour fire-rated systems.
2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

W. 3M Fire Barrier Putty Sleeve Kit: Device used for fire stopping of cable penetrations through fire rated walls and floors.
1. Fire Resistance: For use in 1, 2, 3 or 4 hour fire-rated systems.
2. Locations: Vertical assemblies, horizontal assemblies and smoke barrier.

PART 3 - EXECUTION

3.1 PREPARATION

A. Construct an example of each type fire stop at the site for review and acceptance by the Owner.

B. Penetration shall be clean and free of debris, dirt, and dust, and dry.

C. Apply metal primer when recommended by manufacturer of the fire stopping material.

D. Dam penetration with acceptable material.

3.2 APPLICATION

A. Apply materials in accordance with manufacturer's directions.

B. Install the system in accordance with UL Design Test Report and rating required by the assembly.

C. Install system of same rating as existing and proposed wall, floor, and ceiling.

D. Install-stencil identification label by penetration listing UL # , manufacturer and hour rating.

END SECTION 07 27 10

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SECTION 07 27 29 - AIR-BARRIER COATINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes vapor-retarding air-barrier coatings.

B. Drawings and General Conditions/Provisions of Contract, including Contractual Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 DEFINITIONS

A. Air-Barrier Material: A primary element that provides a continuous barrier to the movement of air.

B. Air-Barrier Accessory: A transitional component of the air barrier that provides continuity.

C. Air-Barrier Assembly: The collection of air-barrier materials and accessory materials applied to an opaque wall, including joints and junctions to abutting construction, to control air movement through the wall.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review air-barrier requirements and installation, special details, mockups, air-leakage and bond testing, air-barrier protection, and work scheduling that covers air barriers.
2. Air Barrier Coating manufacturer representative shall attend.

1.4 ACTION SUBMITTALS

A. (SD-01)(SD-02) Product Data: For each type of product.

1. Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of products.

B. (SD-04) Shop Drawings: For air-barrier assemblies.

1. Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
2. Include details of interfaces with other materials that form part of air barrier.

1.5 INFORMATIONAL SUBMITTALS

A. (SD-13) Qualification Data: For Installer. Include list of ABAA-certified installers and supervisors employed by the Installer, who work on Project.

B. (SD-13) Product Certificates: From air-barrier manufacturer, certifying compatibility of air barriers and accessory materials with Project materials that connect to or that come in contact with the barrier.

C. (SD-10) Product Test Reports: For each air-barrier assembly, for tests performed by a qualified testing agency.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1. Installer shall be licensed by ABAA according to ABAA's Quality Assurance Program and shall employ ABAA-certified installers and supervisors on Project.

B. Mockups for testing: Build mockups to set quality standards for materials and execution.

1. Build integrated mockups of exterior wall assembly, 150 sq. ft., incorporating backup wall construction, external cladding, window, storefront, door frame and sill, insulation, ties and other penetrations, and flashing to demonstrate surface preparation, crack and joint treatment, application of air barriers, and sealing of gaps, terminations, and penetrations of air-barrier assembly.
   a. Coordinate construction of mockups to permit inspection by owners’ testing agency of air barrier before external insulation and cladding are installed.
   b. Include junction with roofing membrane, building corner condition, and foundation wall intersection.
   c. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply air barrier until mockups are approved.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

C. Visual Mock-ups: additional mock-up shall be completed for visual inspection in accordance with Section 01 43 39 “Visual Mock-Up Requirements”.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Remove and replace liquid materials that cannot be applied within their stated shelf life.

B. Protect stored materials from direct sunlight.

1.8 FIELD CONDITIONS

A. Environmental Limitations: Apply air barrier within the range of ambient and substrate temperatures recommended by air-barrier manufacturer.

1. Protect substrates from environmental conditions that affect air-barrier performance.
2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

A. General: Air barrier shall be capable of performing as a continuous vapor-retarding air barrier. Air-barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, penetrations, tie-ins to installed waterproofing, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

2.3 VAPOR-RETARDING, AIR-BARRIER COATING

A. Vapor-Retarding, Air-Barrier Coating: Synthetic polymer membrane.

1. Basis-of-Design Product: Subject to compliance with requirements, provide GCP Applied Technologies, Perm-A-barrier NPL 10 or a comparable, impermeable product by one of the following:
   a. Carlisle Coatings & Waterproofing Inc.
   b. Henry Company.
   c. Approved Substitution.
2. Performance Requirements
   a. Dry mill thickness not less than 40 mils.
   b. Water penetration resistance: joint treatment and primary air barrier and vapor barrier material, comply with ICC ES AC 212, par 4.8.3, no water penetration after 5 hours hydrostatic pressure
   c. Nail sealability: ASTM D 1970, 7.9.1, primary air barrier and vapor barrier passes
   d. Elongation: ASTM D 413, primary air barrier and vapor barrier material, > 500% at 7 days
   e. Adhesion: joint treatment and primary air barrier and vapor barrier material, ASTM D 4541, $\geq$ 35 psi, or exceeds strength of glass mat facing on glass mat gypsum substrates
   f. Surface burning: ASTM E 84, joint treatment and primary air barrier and

vapor barrier material flame spread ≤ 25, smoke developed ≤ 450, Class A building material

g. Water vapor permeance: ASTM E 96 Method A, < 0.1 perms

h. Material air leakage: ASTM D 2178, primary air barrier and vapor barrier and joint treatment < 0.0002 cfm/ft2 at 1.57 psf

i. Assembly air leakage: ASTM E 2357, ≤ 0.004 cfm/ft^2 air leakage after conditioning protocol

j. Field adhesion testing: ASTM D 4541, ≥ 35 psi (207 kPA) or exceeds strength of glass mat facing on glass mat gypsum substrates

2.4 ACCESSORY MATERIALS

A. General: Accessory materials recommended by air-barrier manufacturer to produce a complete air-barrier assembly and compatible with primary air-barrier material.

B. Primer: Liquid waterborne primer recommended for substrate by air-barrier material manufacturer.

C. Butyl Strip: Vapor retarding, 30 to 40 mils thick, self-adhering; polyethylene-film-reinforced top surface laminated to layer of butyl adhesive with release liner backing.

D. Joint Reinforcing Strip: Air-barrier manufacturer's self-adhering glass-fiber-mesh tape.

E. Substrate-Patching Membrane: Manufacturer's standard trowel-grade substrate filler.

F. Adhesive and Tape: Air-barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.

G. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, 0.0187-inch-thick, and Series 300 stainless-steel fasteners.

H. Sprayed Polyurethane Foam Sealant: One- or two-component, foamed-in-place, polyurethane foam sealant, 1.5- to 2.0-lb/cu. ft density; flame-spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.

I. Modified Bituminous Transition Strip: Vapor retarding, 40 mils thick, smooth surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4- mil-thick polyethylene film with release liner backing.

J. Joint Sealant: Single component, neutral curing, ultra-low modulus sealant compatible with air barrier coating and provided by air barrier coating manufacturer.

1. Basis of design product: GCP Applied Technologies, PAB S100.

K. Termination Mastic: Air-barrier manufacturer's standard cold fluid-applied elastomeric liquid; trowel grade.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
2. Verify that concrete has cured and aged for minimum time period recommended by air-barrier manufacturer.
3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
4. Verify that masonry joints are flush and completely filled with mortar.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air-barrier application.

B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching membrane.

E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.

F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.

G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

3.3 JOINT TREATMENT

A. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate

according to ASTM C 1193 and air-barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D 4258 before coating surfaces.

1. Prime substrate and apply a single thickness of air-barrier manufacturer's recommended preparation coat extending a minimum of 3 inches along each side of joints and cracks. Apply a double thickness of air-barrier coating material and embed joint reinforcing in preparation coat.

B. Gypsum Sheathing: Fill joints greater than 1/4 inch with sealant according to ASTM C 1193 and air-barrier manufacturer's written instructions. Apply first layer of air-barrier coating material at joints. Tape joints with joint reinforcing after first layer is dry. Apply a second layer of air-barrier coating material over joint reinforcing.

3.4 TRANSITION STRIP INSTALLATION

A. General: Install strips, transition strips, and accessory materials according to air-barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.

1. Coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.
2. Install modified bituminous transition strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.

B. Connect and seal exterior wall air-barrier material continuously to roofing-membrane air barrier, concrete below-grade structures, floor-to-floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials.

C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.

D. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.

E. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply modified bituminous transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.

1. Modified Bituminous Transition Strip: Roll firmly to enhance adhesion.

F. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.

G. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.

H. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.

I. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.5 AIR-BARRIER COATING INSTALLATION

A. General: Apply air-barrier coating to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions. Apply air-barrier coating within manufacturer's recommended application temperature ranges.

B. Air-Barrier Coatings: Apply a continuous unbroken air-barrier coating to substrates according to the following thickness. Apply an increased thickness of air-barrier coating in full contact around protrusions such as masonry ties.

1. Vapor-Retarding, Air-Barrier Coating: Total dry film thickness as recommended in writing by manufacturer to meet performance requirements, applied in two or more equal coats.
2. Apply additional coats as needed to achieve void- and pinhole-free surface.

C. Apply strip and transition strip a minimum of 1 inch onto cured air-barrier material or strip and transition strip over cured air-barrier material overlapping 3 inches onto each surface according to air-barrier manufacturer's written instructions.

D. Do not cover air barrier until it has been tested and inspected by Owner’s testing agency.

E. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Construction Manager will engage a qualified testing agency to perform tests and inspections.

B. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements.

1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
2. Continuous structural support of air-barrier system has been provided.
3. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.

4. Site conditions for application temperature and dryness of substrates have been maintained.
5. Maximum exposure time of materials to UV deterioration has not been exceeded.
6. Surfaces have been primed, if applicable.
7. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
8. Termination mastic has been applied on cut edges.
9. Strips and transition strips have been firmly adhered to substrate.
10. Compatible materials have been used.
11. Transitions at changes in direction and structural support at gaps have been provided.
12. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
13. All penetrations have been sealed.

C. Air Barrier manufacturer shall make regularly scheduled site visits to inspect installation.

D. Tests: As determined by Owner's testing agency from among the following tests:

1. Qualitative Air-Leakage Testing: Air-barrier assemblies will be tested for evidence of air leakage according to ASTM E 1186, smoke pencil with pressurization or depressurization.

2. Adhesion Testing: Air-barrier assemblies will be tested for minimum air-barrier adhesion of 30 lbf/sq. in. according to ASTM D 4541 for each 600 sq. ft. of installed air barrier or part thereof.

E. Installer shall provide field quality control by staff having adequate prior experience and shall provide the following reports and checklists.

1. Contractor shall provide weekly updates verifying all locations have been inspected and are free of installation defects and damage.
   a. Checklists shall include specific locations of the work and specific location and description of any repairs.
   b. Checklist shall be completed in its entirety and shall be provided weekly to the Construction Manager, Architect, and Owner.
2. Provide field inspection reports within 5 working days of inspection.

F. Air barriers will be considered defective if they do not pass tests and inspections.

1. Apply additional air-barrier material, according to manufacturer's written instructions, where inspection results indicate insufficient thickness.

2. Remove and replace deficient air-barrier components for retesting as specified above.

G. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

3.7 CLEANING AND PROTECTION

A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.

1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. If exposed to these conditions for more than 30 days, remove and replace air barrier or install additional, full-thickness, air- barrier application after repairing and preparing the overexposed membrane according to air-barrier manufacturer's written instructions.
2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.

B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.

C. Remove masking materials after installation.

END OF SECTION 07 27 29

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SECTION 07 54 00 - THERMOPLASTIC MEMBRANE ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B. Related Sections:
1. Section 07 22 16 Roof Insulation Board.
2. Section 07 62 00 Sheet Metal Flashing and Trim.
3. Section 07 71 00 Roof Specialties
4. Section 07 72 00 Roof Accessories.
5. Section 07 92 00 Joint Sealants

1.2 SUMMARY

A. This Section includes thermoplastic membrane roofing system.

B. Miscellaneous steel angles, welds, bolts.

C. To the extent of roof work shown on drawing and specification.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Installed membrane roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Membrane roofing, base flashings, counterflashing, curbs, and copping shall remain watertight.

B. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency to resist wind pressure calculated according to the structural drawing wind speed, load, pressure, exposure, wind pressure zone diagram and schedules. See drawings.
   a. End Zone Distance from Edges (A): See Plan for load diagrams and tables

C. Provide installed roofing membrane and base flashings that remain watertight; do not allow water ponding 24 hours after rain event; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure. Adjust insulation board as required to maintain positive slope.

D. Anchoring Guideline:

1. Membrane Roofing: Fully adhered on Dens-Deck Prime

a. Install adhered sheet.

1) Secure membrane edges under battens or termination bars. Locate battens or termination bars continuously around the edge of the roof on the flat of the deck adjacent to the roof edge or parapet, around penetrations such as curbs in the field of the roof, and elsewhere as detailed.
2) Peel Stops: Install battens or termination bars continuously around the perimeter of the roof.
3) Field membrane sheets shall be installed so the water sheds and the laps do not create a dam.
4) Install crickets where slopes may be dammed by flat surfaces of curbs for roof hatches, vents, fans, etc.

b. Seams: Clean seam areas, overlap roofing membrane, and hot-air weld side and end laps of roofing membrane to ensure a watertight seam installation.

2. Membrane Flashings and Preformed Flashing Accessories: Fully adhered.

a) Flash penetrations and field-formed inside and outside corners with sheet flashing. Prefabricated flashings as furnished by manufacturer are required and should be used wherever possible, field-formed/fabricated are to be used only by acceptance of the Owner.
b) Clean seam areas and overlap and firmly roll sheet flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation.
c) Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

1) Install horizontal rows of intermediate fasteners vertically, up walls, area dividers, and parapets. Install at a maximum of 18" above the finish roof membrane and every 18" vertical.
2) Space fasteners at 6" in these horizontally running vertical rows.

d) Secure top edge of preformed boots and pipe flashings with stainless steel wormgear type drawbands.
e) Apply a bead of sealant large enough to entirely fill the void at shaped term bars, reglets, and drawbands. Tool to shed water and insure full adherence to surfaces.

3. Flexible Walkways:

a. Install flexible walkways between and connecting the main roof access point and rooftop equipment requiring routine or seasonal maintenance or adjustment.

b. Heat weld to substrate and fully adhere walkway products to substrate with compatible adhesive.

c. Maintainability: Design roofing system and its related flashings so that removal of adjoining construction, or other types of adjacent roofing system(s), will not be necessary in order to replace membrane roofing or flashings during the life of the building.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include data substantiating that materials comply with requirements.
   1. Manufacturer’s technical data installation instructions and recommendations for each type of roofing product.
   2. Include data substantiating that materials comply with requirements.
   3. Maintenance standards
   4. Emissivity and solar reflectance values.

B. Samples for verification: For sheet roofing, membrane flashing, roof covering fasteners, termination bars, and battens.

C. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other Work. Drawing plans ¼” scale, details 3”.

   1. Membrane sheet layout.
   2. Membrane flashings and terminations.
   3. Walkpad Layout.
   4. Fastening pattern for field, corner , edge conditions and special conditions.
   5. Calculations for wind load design, signed and sealed by Florida Registered professional engineer in the state of Florida verifying the compliance with ASCE 7-10. and size, spacing and type of fasterner.

D. Installer Certificates: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system with required warranty.

E. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" and “Quality Assurance” Articles.

   1. Submit evidence of meeting performance requirements. Include Engineering Calculations signed and sealed by the qualified professional engineer who was responsible for their preparation.
      a. Copy of warranties.
      b. Submit Florida Product Approval Literature including installation details.
      c. Pre-roofing conference meeting minutes.
      d. Mock up.

e. Manufacturer's inspection, copy of roofing system, manufacturer's inspection reports of roofing installation. Submit separate reports to Owner for each.
f. Coordination drawings showing details including all roofing components and assemblies, such as but not limited to: Equipment curbs, other curbs, roof access hatch. skylight curbs, pipe and conduit supports and penetrations, parapets, copping, drips, flashing, counter flashing and other items as required by the work.

F. Maintenance Data: For roofing system to include in maintenance manuals.

G. Warranties:

1. Notice of Intent to Warrant.
2. Special warranties specified in this Section, paragraph 1.8.

H. Inspections:

1. Obtain from the roofing manufacturer copies of each inspection and furnish a copy to the Architect and Owner. Inform the roofing manufacturer, with regard to warranties, that warranties shall be issued, based upon the acceptance of the roofing work, and that deficiencies noted upon inspection reports have been corrected. The manufacturer shall not refuse or restrict the provisions of its warranty, based upon deficiencies noted on inspection reports, especially any reports that may have not been furnished to the Architect. The Architect will not approve final payment of roofing work until final and interim inspection reports and warranty are in hand. The Architects representative shall accompany the manufacturer's inspector and Roofing Installer during final inspection prior to issuing manufacturer's warranty.

2. Manufacturer's Inspections: Manufacturer inspections shall be accomplished by technical representatives with technical department of the roof membrane manufacturer.

a. In progress inspections. Not less than two (2) for building and 2 for each Alternate accepted..
1) Make first in-progress inspection within seven (7) days of start of installation on each building.
b. Substantial Completion Inspection for each building.
c. Final Completion Inspection for each building.
d. Sumitt copies of reports of field instpections.

3. Roof Inspections: Arrange for roofing systems manufacturer's system technical personnel to provide follow-up inspections of roofing installations.
a. 11th month inspection for each building.
b. 23rd month inspection for each building.

4. Notify Owner not less than 48 hours in advance of dates and times for inspections. Report results in writing.

I. Samples: Bars and battens laboratory test showing roof assembly compliance with SSTD 12-99.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.

1. Allow no work to be done to roof assembly by anyone other than roofing manufacturer's approved Installer.
2. Provide documentation indicating that all personnel onsite that have been trained by the manufacturer and any authorized to operate the automatic and hand welders shall provide documentation from the manufacturer certifying training within the last year.
3. Maintain full-time supervisor, not a foreman / workman, on job site during times that roofing work is in progress. Provide a supervisor with proven experience in roofing similar to nature and scope of specified roofing.

B. Source Limitations: Obtain components for membrane roofing system from roofing membrane manufacturer.

1. Original Manufacture: Provide membrane roofing of original manufacture.
2. Track Record: Provide membrane roofing of same formulation, with not less than a ten (10) year track record of successful performance under the proposed conditions of installation.
3. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.

C. Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.
2. Fire-Resistance Ratings: ASTM E 119, for fire-resistance-rated roof assemblies of which roofing system is a part.

D. Roofing shall have the following measurability and tested values.
1. Emissivity: 0.78 min.

E. Pre-Installation Conference: Conduct conference at Project site. Comply with requirements in Division 01 Section "Project Management and Coordination". Notify participants a minimum of five (5) working days before conference. Review methods and procedures related to roofing system including, but not limited to, the following:

1. Meet with Owner, Owner’s Building Enclosure Consultant, Architect, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.
8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.
10. Document proceedings, including corrective measures or actions required, and furnish copy of record to each participant.

F. Manufacturer's Inspections: Manufacturer inspections shall be accomplished by technical representatives with technical department of roof membrane manufacturer.

1.6 COORDINATION

A. Coordinate roofing work with installers of other work to ensure that components which are to be secured to or stripped into the roofing system are available and that flashings and counterflashings are installed as the work progresses.

1. Phased construction is not acceptable.
   Delayed installation of sheet metal flashing and trim is not acceptable.

1.7 ROOF MAINTENANCE MANUAL

A. Submit a Roof Maintenance and Inspection Manual with warranties and project closeout submittals.

B. Roof Maintenance and Inspection Manual shall include:

1. Cover letter recommending to the Owner that two roof maintenance inspections should be conducted per year.
2. Table of Contents.
3. Visual inspection checklist indicating specific flashings and details to be inspected. Include items such as base flashing, seams, reglets and counterflashings, roof edge flashings, roof penetration flashings, roof curb flashings, boot flashings, roof drain areas, parapet wall flashings, copings, roof membrane seams, etc. Applicable items shall be listed per project.

    a. Include a set of instructions detailing preventative maintenance and noting a list of harmful substances which may damage the roofing membrane.
    b. Include procedures for exercising warranty and guarantee provisions, leak calls, temporary repairs and future modifications to roof system.

4. Copies of as-built roofing details.
5. Roof plan indicating penetrations, detail locations, roof drains, and seams.
6. Copy of SPRI / NRCA "Manual of Roof Inspection, Maintenance and Emergency Repair for Existing Single-Ply Roofing Systems".

1.8 WARRANTY

A. Roofing Manufacturer's System Warranty: Manufacturer's standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials, workmanship, or items identified not in conformance with the project documents within specified warranty period. Failure includes roof leaks.

1. Special warranty includes roofing membrane, base flashings, roofing membrane accessories, walkway products and other components of membrane roofing system.
2. Warranty Period: 20 years from date of Substantial Completion.
3. Special Warranty Rider: Coverage for winds up to and including 120 mph (3-second gust).
4. Provide a warranty for building and square footage.

B. Installer Warranty: Including all components of membrane roofing system such as roofing membrane, base flashing, fasteners, and walkway products.
1. Warranty Period: Two (2) years from date of Substantial Completion.
2. Provide separate warranties and square footage.
3. During the warranty period, upon notification by VPS, the Installer must be on site within 24 hours to make necessary permanent or temporary repairs. Should the Installer fail to make such repairs within the time period, VPS may have the repairs made and charge the cost to the Installer; such repairs by VPS shall not void the system warranty. Emergency repairs required reasonably and immediately to protect life or property shall not void this warranty. Installer roof access shall not be unreasonably denied. Delay of construction contract payment by General Contractor shall not be cause to withhold warranty performance.

C. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering Work of this Section, including all components of membrane roofing system such as roofing membrane, base flashing, fasteners, and walkway products, for the following warranty period:

1. Warranty Period: Two years from date of Substantial Completion.

D. Special Warranty Requirements: Provide separate warranties for each individual building on the school's campus identified as to building and square footage, or separately and specifically identify each building on the school's campus included in and covered by the warranty with its respective square footage. The work will require the original roofing warranty to be maintained current. Written acknowledgement by the original roof installer and manufacturer. That the work in place complies with warranty requirements for continuity of warranty and will include work installed.

E. Maintenance Data: For roofing system to include in maintenance manuals.
1. Comply with requirements in Division 01 Section "Closeout Procedures".
2. Visual Inspection checklist indicating specific flashings and details to be inspected. Include items such as base flashing, seams, reglets and counterflashings, roof edge flashings, roof penetration flashings, roof curb flashings, boot flashings, roof drain areas, parapet wall flashings, copings, roof membrane seams, etc. Applicable items shall be listed per project.
   a. Include a set of instructions detailing preventative maintenance and noting a list of harmful substances which may damage the roofing membrane.
   b. Include procedures for exercising warranty and guarantee provisions, leak calls, temporary repairs and future modifications to roof system
3. Copies of as-built roofing details.
4. Roof plan indicating penetrations, detail locations, roof drains, and seams.
5. Copy of SPRI/NRCA "Manual of Roof Inspection, Maintenance and Emergency Repair for Existing Single-Ply Roofing Systems".
6. FBC Compliance: Contractor's final statement of compliance.
7. Inspection reports: Copy of all roofing system manufacturer's inspection reports of roofing installation shall be submitted for review by the Designer and forwarded to the Owner. Submit separate reports to Owner Designer for each building not to exceed 20,000 sg ft per report per inspection by the Manufacturer's Representative.

1.9 JOB CONDITIONS

A. Pre-Roofing Conference:

1. Prior to the installation of the roofing and associated work, meet as the project site with the installer, the installer of each component of associated work, the installers of the deck or substrate construction to receive roofing work, the installers of other work in and around roofing that must follow the roofing work (including Mechanical Work if any), the Architect and other representatives directly concerned with performance of the work, including (where applicable) insurers, test agencies, product manufacturers,

governing authorities, and the Owner. Record (by Contractor) the discussions of the conference and the decisions and agreements (or disagreements) reached and furnish a copy of the record to each party attending. Review the foreseeable methods and procedures related to roofing work, including, but not limited to, the following:

a) Review Project requirements.

b) Review required submittals, both completed and yet to be completed.

c) Review status of substrate work (not by the roofing installer), including drying, structural loads, limitations and similar considerations.

d) Review availability of materials, tradesman, equipment and facilities needed to make progress and avoid delays.

e) Review required inspection, testing, certifying and accounting procedures.

f) Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions, including the possibility of temporary roofing.

g) Review regulations concerning code compliance, environmental protection, health, safety, fire and similar considerations.

h) Review procedures needed for protection of roofing during the remainder of the construction period.

i) Consider each party's extant judgment, as advanced in the interest of successful completion of the work.

j) Document proceedings, including corrective measures or actions required and furnish copy of record to each participant.

B. Weather Condition Limitations:

8. Proceed with roofing and associated work only when weather conditions will permit unrestricted use of materials and quality control of the Work being installed, complying with the requirements and the recommendations of the roofing materials manufacturer.

a. Proceed only when the installer is willing to guarantee work as required and with out additional reservations and restrictions

9. Apply in dry weather on dry deck only. Where rain or inclement weather occur during application, the Work shall stop and not resume until the weather has cleared and the deck is properly dry.

a. Do not apply adhesives in conditions such as fog, dew, rain or snow, or when frost occurs on the surface on the membrane or substrate.

1.10 ROOF SLOPE

A. Finished roof slope for PVC surfaces shall be ¼ inch per foot (2 percent) minimum for roof drainage

1.11 IMPACT RESISTANCE:

A. Performance testing for impact resistance shall be in accordance with FM 4450, FM 4470 or ASTM D4272 to meet the specified impact resistance requirements.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER:

A. SOPREMA, located at: 310 Quadral Dr.; Wadsworth, OH 44281; Tel: 800-356-3521; Tel: 330-334-0066; Website: www.soprema.us.

B. Fibertite, located at: 1000 Venture Blvd, Wooster, OH 44691; 800-927-8578; Website: www.fibertite.com

C. Duro-Last, located at: 525 Morley Drive, Saginaw, MI 48601; 800-248-0280; Website: www.duro-last.com

2.2 Basis of design, Florida Product approval noted below and details basis of design is Fiber Tite-SM, KEE Sheet as manufactured by Seaman Corporation.

A. Building:
1. Building: Florida Product Approval FL-4930-R-14 System No. S-11.

2.3 Manufacturers:

A. Where title below introduces a list, the following requirements apply for product selection:

1. Products: Subject to compliance with requirements, provide one of the products and respective methods of installation specified.

    a. Product Certification:" Cool Roof Rating Council" (CRCC) Product Certification as recognized by EPA for the Energy Star Program; a third -party rating system for radiative properties of roof surfacing materials.

2.4 ROOFING MEMBRANE

A. PVC MEMBRANE, ADHERED:

A. SOPREMA® SENTINEL® PVC P150: Polyester reinforced, thermoplastic polyvinyl chloride membrane with a smooth back underside.
    1. Overall Thickness ASTM D4434 (ASTM D638): 60 mils minimum
        a. Manufacturer shall provide membrane at specified minimum 60 mils
        b. ASTM D4434 +/- tolerance for membrane thickness will not be accepted.
    2. Thickness over Scrim (ASTM D7635): 30 mils minimum
        a. Manufacturer shall provide membrane with minimum 30 mils compound thickness above reinforcement/scrim
    3. Width: 10 ft (3.0 m)
    4. Length: 100 ft (30.5 m)
    5. Physical Properties ASTM D4434.
        a. Breaking Strength, lbf/in
            1) 430 (MD) 300 (XMD
        b. Elongation at Break - %
            1) 25 (MD) 25(XMD)
        c. Tear Strength, lbf
            1) 150 (MD) 80 (XMD)
        d. Linear Dimensional Change - %
            1) <0.1%

    6. Fully adhered to Adhered cover board Dens-Deck Prime over mechanically attached insulation over mechanically attached Dens Deck Prime base board mechanically attached to metal deck.
    7. Color: white

B. PVC Sheet: ASTM D 4434, Type III, fabric reinforced.

    1. Products: Subject to compliance with requirements, provide one of the following:
        a. Duro-Last Roofing, Inc.; "Duro-Last": Fully adhered to Adhered cover boad Dens-Deck Prime over mechanically attached insulation over mechanically attached Dens Deck Prime base board over metal deck.

    2. Thickness: 60 mils, nominal, membrane.
    3. Color: “Bright White”.

C. KEE Sheet: ASTM D 6754, fabric reinforced. (Basis of Design)

1. Products: Subject to compliance with requirements, provide one of the following:

a. Seaman Corporation; "8552 FiberTite-SM".

1) "8552 Fiber Tite-SM "60 mills, fully adhered over, Dens-Deck Prime Cover over Rigid Insulation over Dens-Deck Prime Base board, both Rigid insulation and Base board shall be mechanically attached to metal deck below.

2. Color: White.

3. Thickness: 60 mils (1.5 mm) min membrane.

D. Membrane shall meet EPA Energy Star standards.

2.5 AUXILIARY MATERIALS

A. General: Auxiliary materials recommended by roofing manufacturer for intended use and compatible with roofing membrane.

B. Sheet Flashing: Manufacturer’s standard sheet flashing of same material, type, reinforcement, thickness, and color as sheet membrane for adhered or mechanically attached systems.

C. Laminated Metal: Manufacturer's standard minimum FiberCLAD 0.040" 3003H14 Aluminum laminated with a minimum of 20 mil compatible polymeric coating, of same color as sheet membrane.

D. Bonding Adhesive:
1. Roofing Membrane: Manufacturer’s standard solvent or water based bonding adhesive for membrane.
2. Sheet Flashing: Manufacturer’s standard solvent based bonding adhesive for base flashing.

E. Metal Termination Bars: Manufacturer's standard predrilled stainless steel or aluminum bars, approximately 1/8 inch by 1 inch, 6060-T5 aluminum with anchors.

F. Metal Battens: Manufacturer's standard aluminum-zinc-alloy coated or zinc coated steel sheet, or aluminum alloy bar, approximately 1 inch wide, pre-punched.

G. Polymeric Battens: Manufacturer’s standard high performance thermoplastic polymer strip, approximately 1 inch wide, pre-punched.

H. Fasteners: Factory coated steel fasteners and metal or plastic plates meeting corrosion resistance provisions in FMG 4470, designed for fastening membrane to substrate, and acceptable to membrane roofing system manufacturer.

I. Miscellaneous Accessories: Provide preformed cone and vent sheet flashing, preformed inside and outside corner sheet flashing, T-joint covers, termination reglets, cover strips, and other accessories.

J. Flexible Walkways: Factory-formed, nonporous, heavy duty, slip resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick and acceptable to membrane roofing system manufacturer.

K. Pitch Pans: Pitch Pans are not acceptable.

L. Roofing Curbs: Provide roofing curbs at all penetrations using products as manufactured by the Pate Company, Lombard IL., www.patecurbs.com or by the following:
   1. Portals Plus, www.portalsplus.com
   2. R.P.S. Corporation, www.rpscurbs.com
   3. Thaler Metal USA, Inc., www.partsdome.com/thalermetal
   4. See Drawing details.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify deck condition is suitable for the specified installation of roofing system. Do not proceed with application until all defects have been corrected.

B. Insulation is to be installed to provide positive slope and subsequent positive drainage of new roofing system.

C. Finished surface(s) to receive new roof system shall be smooth and level without significant surface depressions or irregularities. Caber differentials greater than 3/16 inch must be leveled using a cementitious grout.

D. Finished surfaces shall be free of moisture, dust, loose debris and other irregularity that may hinder the proper performance of the roofing system.

3.2 ROOFING MEMBRANE INSTALLATION

A. Install roofing membrane over area to receive roofing according to membrane roofing system manufacturer's written instructions, either fully adhered or mechanically attached, based on product and deck type. Unroll roofing membrane and allow to relax before installing.

   1. Install adhered sheet according to ASTM D 5036.

a. Secure membrane edges under battens or termination bars. Locate battens or termination bars continuously around the edge of the roof on the flat of the deck adjacent to the roof edge or parapet, around penetrations such as curbs in the field of the roof, and elsewhere as detailed.
b. Peel Stops: Install battens or termination bars continuously around the perimeter of the roof.

2. Install mechanically fastened sheet according to ASTM D 5082.

a. Install half sheets at roof perimeters and corners. Install full sheets at roof field.
b. Secure membrane edges under battens or termination bars. Locate battens or termination bars continuously around the edge of the roof on the flat of the deck adjacent to the roof edge or parapet, around penetrations such as curbs in the field of the roof, and elsewhere as detailed.
c. Peel Stops: Install battens or termination bars continuously around the perimeter of the roof. Peel stops installed at distances from the roof edge corresponding to half-sheet dimension may take the place of the half-sheet installation requirement.

3. Seams: Clean seam areas, overlap roofing membrane, and hot-air weld side and end laps of roofing membrane to ensure a watertight seam installation.

B. Membrane Flashings and Preformed Flashing Accessories: Fully adhere.

1. Flash penetrations and field-formed inside and outside corners with sheet flashing. Prefabricated flashings as furnished by manufacturer are required and should be used wherever possible. Field-formed/fabricated are to be used only by acceptance of the Owner.
2. Clean seam areas and overlap and firmly roll sheet flashings into the adhesive. Weld side and end laps to ensure a watertight seam installation. Secure top edge of preformed boots and pipe flashings with drawbands.
3. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.
   a. Install horizontal rows of intermediate fasteners vertically, up walls, area dividers, and parapets. Install at maximum 18" above the finish roof membrane and every 18" vertical.
   b. Space fasteners at 6" in these horizontally running vertical rows.
4. Secure top edge of preformed boots and pipe flashings with stainless steel wormgear type drawbands.
5. Apply a bead of sealant large enough to entirely fill the void at shaped term bars, reglets, and drawbands. Tool to shed water and insure full adherence to surfaces.

C. Flexible Walkways:

1. Install flexible walkways between and connecting the main roof access point and rooftop equipment requiring routine or seasonal maintenance or adjustment.

2. Heat weld to substrate and fully adhere walkway products to substrate with compatible adhesive.

3.3 PROTECTION & PREPARTION

A. Protect adjacent areas, surfaces, curbs. Provide temporary walking surfaces per manufacture's recommendation to protect the existing membrane from puncture and excessive wear.

B. Vertical surfaces: Clean all vertical surfaces to receive membrane of deleterious and incompatible material due to the demolition and removal of old membranes and flashing. Prepare all surfaces using manufacturer approved cleaners and repair surfaces acceptable to receive adhesive, fastener and membrane.

3.4 FIELD QUALITY CONTROL

A. Manufacturer Roof Inspections: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on each building and submit separate reports to RPR and Architect for each.

1. In-progress inspections: Not less than three (3) for base bid per inspection and per accepted Alternate.

   a. Make first in-progress inspection within four (4) days of start of installation on each building.

2. Substantial Completion inspection for each building.
3. Final Completion inspection for each building.

B. Follow-up Roof Inspections: Arrange for roofing system manufacturer's technical personnel to provide follow-up inspections of roofing installation on each building and submit separate reports to Owner for each.

1. 11th month inspection for each building.
2. 23rd month inspection for each building.

C. Notify Architect and Owner 48 hours in advance of date and time of inspection.

D. Written and signed documentation shall be provided by the Manufacturer Technical Inspection Representative indicating all deficiencies identified in their reports have been corrected and verified.
   1. Manufacturer's Technical Representative shall provide written report for every field inspection and forward copy to RPR, Architect, General Contractor, VPS and Building Enclosure Consultant..

3.5 ROOFING INSTALLER'S WARRANTY

A. SAMPLE

WHEREAS <Insert name> of <Insert address>, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner: <Insert name of Owner.>
2. Address: <Insert address.>
3. Building Number(s)/Square footage(s): <Insert information>.
4. Address: <Insert address.>
5. Date of Building Substantial Completion: <Insert date>.
6. Warranty Period: <Insert time.>
7. Expiration Date: <Insert date.>

AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period he will, at his own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

    a. lightning;
    b. peak gust wind speed exceeding 150 mph (3 second gust);
    c. fire;
    d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
    e. faulty construction of parapet walls, copings, vents, equipment supports, and other edge conditions and penetrations of the work;
    f. vapor condensation on bottom of roofing; and
    g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner.

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.

3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. Owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.

    a. Roofing Installer shall guaranty to respond to all notifications within forty-eight (48) hours and to make all such repairs as deemed necessary to correct said leaks or defects to the satisfaction of the Owner, such satisfaction shall not be unreasonably withheld.
    b. Roofing Installer acknowledges Owner's right to make emergency repairs without violating this warranty, if the Roofing Installer does not respond within forty-eight (48) hours of notification by the Owner of a defect or leak.

7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

IN WITNESS THEREOF, this instrument has been duly executed this <Insert day> day of <Insert month>, <Insert year>.

Authorized Signature:
Name/Title:

END OF SECTION 07 54 00

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SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following sheet metal flashing and trim:

1. Manufactured reglets.
2. Formed roof drainage system; Gutters, Rain leaders.
3. Formed wall flashing, counter flashing and trim.
4. Formed equipment curb flashing.
5. Misc flashing required by the work.

1.3 SUBMITTALS

A. (SD-01)(SD-02) Product Data and Samples: Manufacturer’s technical product data printed installation instructions and general recommendations for each specified sheet material fabricated product.

B. (SD-04) Shop Drawings: Show installation layouts of sheet metal flashing and trim, including plan layout at 1/4–inch scale, elevations, profiles, expansion-joint locations, and keyed details at 3-inch scale. Distinguish between shop- and field-assembled work.

1. Include details for forming, joining, supporting, and securing sheet metal flashing and trim, including pattern of seams, termination points, fixed points, expansion joints, expansion-joint covers, edge conditions, special conditions, and connections to adjoining work; including trim/ fascia units, and scuppers.

C. (SD-18) Samples: For each exposed product and for each finish specified. Eight inch square samples of specified sheet materials to be exposed as finished surfaces.

D. (SD-13) Engineered drawings & calculations, signed and seal by a State of Florida Registered Professional Engineer, certifying compliance with wind loads as required by FBC 2017 (current edition) for code approval.

E. (SD-08) Submit Supervisor’s/Foreman resumes.

1.4 QUALITY ASSURANCE

A. Sheet metal workmanship including forming of joints anchoring, cleating and provisions for expansion shall conform to the standard details and recommendations of the copper and brass research association; and workmanship of the best quality, in accordance with best trade practice and the recommendations and specifications of the Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" and the Florida Building Code latest edition unless more stringent requirements are specified or shown on Drawings.

B. Fabricator Qualifications: Fabricator and Installer shall be a company specializing in sheet metal work and installation with five (5) years documented experience.

C. Conduct on site pre-installation conformance, including the Contractor and Roofing Contractor. Agenda includes phasing of work, product installation, quality control, inspection and other.

D. Installer shall maintain a full-time Supervisor/Foreman, not a Foreman/Workman, on the roof during times that the work of this Section is in progress. The Supervisor/Foreman shall not be employed on any other project during the course of this project and shall not be removed without approval of the Architect/Engineer.

E. In addition to complying with applicable codes and regulations, comply with recommendations contained in “Architectural Sheet Metal Manual”, latest edition, of the Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA).

F. In addition to complying with applicable codes and regulations, comply with recommendations contained in “Sealants: The Professional’s Guide”, latest edition, of the Sealant, Waterproofing & Restoration Institute (SWR).

G. Coordinate installation of roofing and flashing and sheet metal work as a single integrated unit of work, without division of responsibility. Single installer responsibility is required.

H. Edge metals shall be furnished and installed in accordance with Chapters 15 & 16 of the SIXTH Edition (2017) FBC. Test will be conducted by General Contractor by testing agency. Test results will be provided by General Contractor indicating compliance with ANSI/SPRI ES– 1 with basic wind speeds taken from Table 1609 of Chapter 16, Sixth Edition 2017 FBC.

1.5 MOCKUP

A. Prior to the installation of flashing and sheet metal work, provide sample mock ups using materials required for final work.

B. Install mock up on the project, where directed, indicating the proposed workmanship to be executed in the completed Work. Provide special features as required and directed including sealants installation and continuous work.

C. Obtain Architect/Engineer's acceptance of visual qualities, component, and installation approval before start of flashing and sheet metal work.

1.6 WARRANTY

A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.

B. See Section 07 54 00 Thermoplastic Roofing applies to this Section to its full extent.

1.7 PERFORMANCE REQUIREMENTS

A. General: Install sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement.

B. Water Infiltration: Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

PART 2 - PRODUCTS

2.1 SHEET METALS

A. Aluminum Sheet: ASTM B 209, Alloy 3003, 3004, 3105, or 5005, Temper suitable for forming and structural performance required, but not less than H14, finished as follows:

1. Anodized Finish: Apply the following coil-anodized finish:

a. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

B. Stainless Steel: ANSI Type 304, ASTM A167, 2-D Annealed finish, soft, except harder temper required for forming or performance. For welding use Type 304 L.
1. For Metal Edge: 0.0250 Inches, 22 gauge, except as otherwise shown.
2. For Cleats: 0.0312 Inches, 20 gauge, except as otherwise shown.
3. For all Flashings: 0.0250 Inches, 20 gauge, except as otherwise shown.
4. For Copings: 0.0250 Inches, 20 except as otherwise shown.

C. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality, mill phosphatized for field painting.

D. For Fastening Sheet Metal to Masonry.
   1. ¼ inch diameter "TruFast CF Tap Grip" of sufficient length for 1 ¼ inch penetration.

2.2 UNDERLAYMENT MATERIALS

A. Membrane Underlayment: See section Thermoplastic Membrane Roofing Section 07 54 00 for extension of roofing system membrane over curbs, wall surfaces, supports and under sheet metal flashing and trim.

2.3 FASTENERS

A. For Fastening Sheet Metal to Sheet Metal.
   1. 1/8 inch diameter rivet, 300 series stainless steel mandrel and pin.
   2. No. 12, 304 stainless steel screw of sufficient length for ½ inch penetration.

B. For Fastening Sheet Metal to Wood Nailers.
   1. 11 or 12 gauge angular shank nail, 304 stainless steel of sufficient length for 1 ¼ inch nailer penetration.
   2. No. 8 or 10 "Protech Deck Stainless Steel Screw" of sufficient length for 1 ¼ inch nailer penetration.

2.4 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Solder for Stainless Steel: ASTM B-32, 60-40 tin/lead.

B. Flux for Stainless Steel: Acid-Chloride type.

C. Flux Cleaner: Washing soda solution, 5% to 10%.

D. Welding Electrodes and Filler: Materials which will blend, match the color of metal being joined, and will avoid discoloration at welds.

E. Sealants: Approved Products
   1. Sonneborn, NP-1
   2. Tremco, Vulkem 116
   3. Silka, Silkaflex 201

F. Sealant Tape: Approved Products
   1. Sika, Sikalastomer 95 tape, ½ inch width x 1/8 inch thickness
   2. Gulf Seal, MB-10A sealant, ½ inch width x 1/8 inch thickness
   3. Tremco, 440 tape, ½ inch width x 1/8 inch thickness

G. Flashing Tape: Andek Corporation, "Evo Stik Flashband"

H. Metal Accessories: Provide sheet metal clips, straps, and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gauge required for performance.

I. Foam Backer Rod: Compressible rod stock of 2 lb/cu ft density, closed cell extruded polyethylene foam as recommended by sealant manufacturer when used for back-up of, and compatibility with sealant.

J. Miscellaneous Materials: All other materials and accessories not specifically described, but required for a complete and proper installation, shall be subject to the approval of the Architect/Engineer.
   1. Temporary materials shall not be used.

2.5 FABRICATION, FIELD MEASUREMENTS

A. The sheet metal fabricator is responsible for details and dimensions controlled by the drawings. Make field measurements for verification of these dimensions.

B. Required sizes for flashings, including profile requirements are shown on drawings. Any variable dimensions are indicated, together with maximum and minimum dimensions required to achieve design requirements and coordination with other work.

C. The roof installer and sheet metal fabricator shall cooperate to establish and maintain these dimensions.

2.6 MANUFACTURED SHEET METAL FLASHING AND TRIM

A. Reglets: Units of 0.0187 inch thick Stainless steel, type and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory- mitered and -welded corners and junctions.

   1. Surface-Mounted Type: Provide with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
   2. Stucco Type: Provide with upturned fastening flange and extension leg of length to match thickness of applied finish materials.
   3. Concrete Type: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.
   4. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
   5. Flexible Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
   6. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Expansion-Joint Cover: Fabricate from the following material:

1. Aluminum: Minimum 0.050 inch thick.
2. Stainless Steel: Minimum 0.0250 inch thick.
3. Galvanized Steel: Minimum 0.0336 inch thick.

B. Counterflashing: Fabricate from minimum 0.0187 inch thick Stainless Steel.

C. Flashing Receivers: Fabricate from minimum 0.0156 inch thick Stainless Steel.

D. Roof-Drain Flashing: Fabricate from 4.0 lb/sq. ft., hard tempered Lead.

2.8 MISCELLANEOUS SHEET METAL FABRICATIONS

A. Overhead-Piping Safety Pans: Fabricate from minimum 0.0396 inch thick Galvanized Steel.

B. Sheet Metal Enclosure for Piping Through Roof Deck: Provide a sheet metal enclosure with removable top according to the following specification-plates in the NRCA's "Roofing and Waterproofing Manual" 5th Edition.

1. Thermoplastic Roof Membrane: Plates TP-16 and TP-16S.

2. Or as shown on the drawing.

2.9 FABRICATION, GENERAL METAL FABRICATION

A. Shop-fabricate work to greatest extent possible.

B. Comply with details shown, and with applicable requirements of SMACNA Manual.

2.10 FABRICATION, FORMING

A. All fabrication of edge metal flashing shall be in accordance with ANSI/SPRI ES-1.
1. Only metal edge components tested to be in compliance with ANSI/SPRI ES-1 shall be approved for use on this project.
2. Metal edge components shall also be accepted from NRCA's ITS authorized fabricators who have successfully completed third-party verification of compliance with NRCA's certification listing program.

3. See http ://www. nrca. net/consumer/tech nical/details/authfab . pdf for a list.

B. Form sheet metal work accurately to the sizes and profiles required to fit substrates.

C. Form exposed sheet metal work without excessive oil-canning, buckling, and tool marks, true to line and levels indicated.

D. Form sheet metal work in maximum lengths and keep joints to a minimum.

2.11 FABRICATION, SOLDERING FABRICATIONS IN STAINLESS STEEL

A. Edges of all sheets to be soldered, shall be tinned with solder on both sides for width not less than 1/2 inch.

B. Clean and flux metals prior to soldering.

C. All soldering shall be done slowly with well heated irons - to heat sheet thoroughly and to sweat solder completely through full width of seam.

D. Ample solder shall be used and seam shall show at least one full inch of evenly flowed solder.

E. Whenever possible, all soldering shall be done in a flat position.

F. Seams on slopes steeper than 45° shall be soldered a second time.

G. Soldering shall be done with heavy soldering irons blunt design, properly tinned before using.

H. As work progresses, neutralize excess flux with 5% to 10% washing soda solution, and thoroughly rinse free of stains.

2.12 FABRICATION, WELDING FABRICATIONS IN ALUMINUM

A. Clean metals prior to welding.

B. All welding shall be done slowly with clean tungsten, to weld completely through full width.

C. Ample filler rod shall be used. Seam shall show evenly flowed weld.

D. As weld progresses, thoroughly wash and clean stains.

2.13 FABRICATION, POP RIVET AND CAULKING FABRICATIONS IN COATED METAL

A. Clean coated metal.

B. Pop rivet fabrications securely to form one continuous piece.

C. Caulk all cut edges to form one continuous membrane finish.

2.14 FABRICATION, JOINING

A. lock and slip joints in accordance with applicable SMACNA Manual requirements.

B. Joints are to be made so that slight adjustments of the metal work can be made, and at the same time remain water tight.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by fabricator or manufacturers of dissimilar metals.

B. Protect existing to remain from damage during demolition and installation of new construction. Replace existing damaged caused by the Contractor.

C. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks; true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.

D. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

E. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or

intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.

F. Fasteners: Use fasteners of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.

1. Aluminum: Use aluminum or stainless-steel fasteners.
2. Stainless Steel: Use stainless-steel fasteners.

G. Seal joints with sealant as required for watertight construction.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement either way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.

H. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pretin edges of sheets to be soldered to a width of 1-1/2 inches except where pretinned surface would show in finished Work.

1. Do not solder prepainted, metallic-coated steel and aluminum sheet.
2. Pretinning is not required for lead.
3. Stainless-Steel Soldering: Pretin edges of uncoated sheets to be soldered using solder recommended for stainless steel and phosphoric acid flux. Promptly wash off acid flux residue from metal after soldering.
4. Do not use open-flame torches for soldering. Heat surfaces to receive solder and flow solder into joints. Fill joints completely. Completely remove flux and spatter from exposed surfaces.

3.2 ROOF FLASHING INSTALLATION

A. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with elastomeric sealant.

1. Secure in a waterproof manner by means of snap-in installation and sealant or lead wedges and sealant.

B. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Install flashing as follows:

1. Turn lead flashing down inside vent piping, being careful not to block vent piping with flashing.

C. Install metal work free of dents stall metal work free of dents, without waves, warps, buckles, fastening stresses or distortion; allowing for expansion and contraction.

D. Locate and install metal work plumb, level, and in alignment with adjacent work.

E. Form tight joints, with exposed joints accurately fitted together. Provide reveals and openings for sealants, as shown.

F. Anchor sections of metal work in accordance with fastener type and spacing shown on the details. Every effort has been made to detail each fastener condition. Where a field condition is not detailed, fasten in accordance with ANSI SPRI ES-1.

G. Coat contacting dissimilar metals with bituminous coating 7 1/2 mil dry thicknesses, minimum, applied to each contacting metal face.

H. Review the construction details for additional specific installation requirements, coordinated with the roofer.

3.3 SEALANTS AND TAPES

A. Install sealants tapes in strict accordance with manufacturer's recommendations, taking care that they are deposited in uniform, continuous ribbons without gaps or air pockets; with complete "wetting" of joint bond surfaces equally on opposite sides.

B. Any sealant or tape found to be "lifting" or not anchored properly shall be totally removed, re-primed, and replaced. Resealing over previously installed material will not be allowed.

C. Indication of lack of skill on the part of the installers shall be sufficient grounds for the Architect/ Engineer to reject installed sealant or tape, which requires its immediate removal and complete resealing at no additional cost to the Owner.

3.4 CLEANING AND PROTECTION

A. Cleaning: Clean exposed surfaces, removing substances which might cause corrosion of metal or deterioration of finishes.

B. Protection: Installer shall advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction, to ensure that work will be without damage or deterioration, other than natural weathering, at time of Substantial Completion.

3.5 MISCELLANEOUS FLASHING INSTALLATION

A. Overhead-Piping Safety Pans: Suspend pans from pipe and install drain line to plumbing waste or drain line.

B. Sheet Metal Enclosure for Piping Through Roof Deck: Coordinate installation of sheet metal enclosure with installation of roofing and other items penetrating roof as roof installation progresses.

END OF SECTION 07 62 00

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SECTION 07 71 00 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section.

B. Related Sections:
   1. Section 05 31 00 Steel Decking
   2. Section 05 50 00 Metal Fabrications
   3. Section 07 22 16 Roof Board Insulation
   4. Section 07 54 00 Thermoplastic Insulation
   5. Section 07 62 00 Sheet Metal Flashing and Trim

1.2 SUMMARY

A. This Section includes the following manufactured roof specialties:

   1. Copings.
   2. Roof edge flashings.

1.3 PERFORMANCE REQUIREMENTS

A. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

B. SPRI Wind Design Standard: Manufacture and install copings and roof-edge flashings tested according to SPRI ES-1, and capable of resisting the following design pressures.

   1. Wind Loads: In accordance with Florida Building Code 2017.
      a. See Structural Drawings and Schedule for wind loads, wind pressure and exposure.
      b. See Florida Product Approval on drawing. Sheet AL002

1.4 SUBMITTALS

A. (SD-01)(SD-02) Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. (SD-04) Shop Drawings: Show layouts of manufactured roof specialties, including plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Identify factory- vs. field-assembled work. Include details for expansion and contraction; layout of fasteners, cleats, clips, and other attachments; termination points and assemblies; and special conditions. Prepared by or under the supervision of a qualified professional engineer.

1. Do not prepare shop drawing until field conditions are verified.

C. (SD-10) Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for copings and roof edge flashings.

1. Submit evidence of meeting performance requirements. Include test reports signed and sealed by the qualified professional engineer witnessing the test and preparing the report.

D. (SD-14) Warranty: Sample of special warranties.

E. (SD-13) Provide Florida Product Approval certificates in compliance with wind load requirements.

1.5 WARRANTY

A. Manufacturer Warranty: Manufacturer’s standard form, without monetary limitation (NDL Type), in which manufacturer agrees to repair or replace components of membrane roofing system that fail in material, workmanship, items identified not in conformance with the project documents within specified warranty period. Failure includes roof leaks.

1. Warranty includes roofing membrane, base flashing, roof membrane accessories, walking products, coping, curbs, roof hatch, pipe supports.
2. Provide warranty for all building and square footage covered by the warranty with respect to square footage.

B. Special Wind Resistance Guarantee: Manufacturer's standard form against wind induced failure within specified warranty period.

1. Wind Resistance Warranty Period: 20 years from date of Substantial Completion.
2. Wind Speed: Not less than that of the related roofing system.
3. Warranty for coping against wind blow off.

C. Special Material Warranty: Manufacturer's standard form against material defect within specified warranty period.

1. Material Defect Warranty Period: 5 years from date of Substantial Completion.
2. Material Defect Warranty against coping blow off.

D. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 20 years from date of Substantial Completion.
2. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

PART 2 - PRODUCTS

2.1 EXPOSED METALS

A. Aluminum Sheet: ASTM B 209, alloy and temper recommended by manufacturer for use and finish indicated, finished as follows:

1. Surface: Smooth, flat finish.
2. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.

B. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by manufacturer for type of use and finish indicated, finished as follows:

1. High-Performance Organic Finish: AA-C12C42R1x (Chemical Finish: cleaned with inhibited chemicals; Chemical Finish: acid-chromate-fluoride-phosphate conversion coating; Organic Coating: as specified below). Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Fluoropolymer 2-Coat System: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight; complying with AAMA 2605.

2.2 CONCEALED METALS

A. Aluminum Sheet: ASTM B 209, alloy and temper recommended by manufacturer for use and structural performance indicated, mill finished.

B. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.

C. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.

D. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality.

2.3 MISCELLANEOUS MATERIALS

A. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to withstand design loads.

1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching color of sheet metal.

B. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.

C. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

2.4 COPINGS

A. Copings: Manufactured coping system consisting of formed-metal coping cap in section lengths not exceeding 12 feet, concealed anchorage, concealed splice plates with same finish as coping caps, mitered corner units, and end cap units.

1. Manufacturers:

a. Hickman, W. P. Company; 800-892-4031, http://www.wph.com/ Basis of Design.
b. Metal-Era, Inc.; 800-588-2162, http://www.metalera.com/ .
c. Architectural Products Company; 800-837-1001, http://www.archprod.com/ .

2. Coping Caps: Fabricated from minimum 0.050 inch thick Aluminum.
3. Coping Cap Color: Color to be selected by Architect or as indicated on the drawings.
4. Inside and Outside Corners: Continuously welded and sealed watertight, weld inside, outside and top corner units creating a single corner unit inside and outside.
5. Special Fabrications: As indicated and required.

6. Snap-on Coping Anchor Plates: Concealed, stainless steel sheet, 12 inches wide, 0.028 inch thick, with integral cleats.
7. Face Leg Cleats: Concealed, continuous stainless steel sheet.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install manufactured roof specialties according to manufacturer's written instructions. Anchor manufactured roof specialties securely in place and capable of resisting forces specified in performance requirements. Use fasteners, separators, sealants, and other miscellaneous items as required to complete manufactured roof specialty systems.

1. Install manufactured roof specialties with provisions for thermal and structural movement.
2. Torch cutting of manufactured roof specialties is not permitted.
3. Protect existing adjacent installation which is to remain. Replace damaged components.

B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum or stainless-steel manufactured roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing exposed-to-view components of manufactured roof specialties directly on cementitious or wood substrates, install a course of PVC roof system flashing underlayment.

3.2 COPING INSTALLATION

A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.

B. Anchor copings to resist uplift and outward forces according to performance requirements.

1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer's recommended spacing.

END OF SECTION 07 71 00

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SECTION 07 72 00 - ROOF ACCESSORIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General conditions provisions of the contract including contractual conditions, and division 1 specifications.

1.02 SUMMARY

A. This Section includes the following:

1. Roof scuttle.

1.03 SUBMITTALS

A. (SD-02) Product Data: For each type of product indicated. Include construction details, materials, dimensions of individual components and profiles, and finishes.

B. (SD-04) Shop Drawings: Show fabrication and installation details. Indicate dimensions, weights, loadings, required clearances, method of field assembly, and components. Include plans, elevations, sections, details, and attachments to other Work.

1. Anchoring system for equipment supports and roof hatches shall comply with the requirements of the Florida Building Code.

C. (SD-25) Coordination Drawings: Roof plans drawn to scale and coordinating penetrations and roof-mounted items. Show the following:

1. Size and location of roof accessories specified in this Section.

2. Method of attaching roof accessories to roof or building structure.

3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.

1.04 QUALITY ASSURANCE

A. Standards: Comply with the following:

1. SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.

2. NRCA's "Roofing and Waterproofing Manual" details for installing units.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

A. Roof Hatch:

1. Cover and liner: 11 gauge (0.090-inch) aluminum cover with 1 inch rigid fiberboard insulation and 18 gauge (0.040-inch) aluminum cover liner.

2. Curb: 11 gauge (0.090-inch) aluminum curb with 1 inch rigid fiberboard insulation.

3. Hinges: Type 316 stainless steel tamper-proof hinge contained within hatch as part of spring assembly.

4. Latch: Type 304 stainless steel slam latch with turn handle and inside/outside padlock hasps.

5. Springs: Greased heavy-duty compression springs in telescoping tubes.

6. Hardware: Type 316 stainless steel hold open arm(s) with red vinyl grip handle that automatically locks door when opened. Furnish hatches with interior padlock hasp and EPDM draft seal.

7. Mounting Flanges:

a. Single Wall Curb with 3.5” horizontal mounting flange

b. Double Wall Curb with 3.5” horizontal mounting flange

c. Curb Mount with 3” vertical mounting flange

B. Insulation: Manufacturer's standard rigid or semirigid glass-fiber board of thickness indicated.

C. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by manufacturer. Match finish of exposed fasteners with finish of material being fastened. If in contact with FR wood use stainless steel fasteners.

2.02 FINISHES:

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Finish designations prefixed by AA comply with system established by Aluminum Association for designating aluminum finishes.

C. Aluminum: Mill finish.

D. Steel: Stainless Steel with Factory- applied powder coat.

2.03 SAFETY RAILINGS: Model # SRC

A. Top rail, Mid rail and upright posts: Galvanized Steel Pipe, 1 ¼” ID, A53 Grade B pipe.

B. Exit: Self Closing Gate; Galvanized Steel Pipe, 1 ¼” ID A53 Grade B pipe, U bolt with hinge attachment and galvanized mounting bolts and nut hardware.

C. Fittings: Manufacturer’s standard aluminum magnesium alloy, cast with set screw pipe mount

D. Counterflash Mount: CRS, zinc plated mounting bracket with backer plate, pemmed nut for easy installation.

E. Hardware: Bolts and Tooling: 3/8 inch by 2-1/2 inch, grade Z, zinc plated, wrench for assembly

F. OSHA Compliance: Provide hatch safety railing system as required by OSHA Standard 1910.23 and 1910.27 and as specified.

1. Top Rail Height: 42 inches +/-3” above finished roof deck.

2. Top-Mid Rail Spacing: 21” diameter maximum..

3. Upright post maximum spacing of 8’.

G. Color: Safety Yellow

2.04 LADDER-ASSIST POST: Model SP roof-hatch manufacture’s standard device for attachment to roof access ladder.

A. Operation: Post locks in place on full extension: release mechanism returns post to closed position

2.05 MANUFACTURER

A. Other Manufactures: Subject to compliance with requirements, manufacturers producing roof hatches meeting the requirements indicated that may be incorporated into the Work include, but are not limited to the following:

1. Nystrom Inc.

2. Bilco

3. Custom Curb, Inc.

4. or approved substitution

2.06 FABRICATION

A. Series "Hurricane Hatch" Aluminum Roof Hatch Model, RHHA NOA No.18-18-0110.04, Florida Product Approval No FL-22631-R2

1. Model and Manufacturer – Basis of Design: Nystrom Building Products; Model RHHA 30x36S1T – Hurricane Zone Rated.

a. Size: 30" inch x 36" inch.

b. Curb Height: 12-inches.

2. Other Manufactures: Subject to compliance with requirements, manufacturers producing roof hatches meeting the requirements indicated that may be incorporated into the Work include, but are not limited to the following:

a. Bilco

b. Custom Curb, Inc.

c. or approved substitution

PART 3 EXECUTION

3.01 INSTALLATION

A. Comply with the following:

1. SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.

2. NRCA's "Roofing and Waterproofing Manual" details for installing units.

3.02 CLEANING AND PROTECTION

A. Clean exposed surfaces according to manufacturer's written instructions. Touch up damaged metal coatings.

END OF SECTION 07 72 00

SECTION 07 84 20 - FIRE RESISTIVE JOINT SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Design Documents and other division 7 specifications.

1.2 SUMMARY

A. This Section includes fire-resistive joint systems for the following:

1. Floor-to-floor joints.
2. Floor-to-wall joints.
3. Head-of-wall joints.
4. Wall-to-wall joints.

1.3 PERFORMANCE REQUIREMENTS

A. General: For joints in the following constructions, provide fire-resistive joint systems that are produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of assembly in which fire-resistive joint systems are installed:

1. Fire-resistance-rated load-bearing walls, including partitions, with fire-protection-rated openings.
2. Fire-resistance-rated non-load-bearing walls, including partitions, with fire-protection-rated openings.
3. Fire-resistance-rated floor assemblies.
4. Exterior curtain-wall assemblies and fire-resistance-rated floor assemblies.

B. Fire Resistance of Joint Systems: Assembly ratings and movement capabilities indicated, but with assembly ratings not less than that equaling or exceeding fire-resistance rating of constructions in which joints are located, as determined by UL 2079.

1. Load-bearing capabilities as determined by evaluation during the time test.

C. Fire Resistance of Perimeter Fire-Containment Systems: Integrity and insulation ratings indicated as determined by UBC Standard 26-9 and UL 2079.

1.4 SUBMITTALS

A. (SD-01)(SD-02) Product Data: For each type of product indicated.

B. (SD-04) Shop Drawings: For each fire-resistive joint system, show each kind of construction condition in which joints are installed and relationships to adjoining construction. Include fire-resistive joint system design designation of testing and inspecting agency acceptable to authorities having jurisdiction that demonstrates compliance with requirements for each condition indicated.

C. (SD-13) Submit one (1) electronic copy in PDF or DWF to the OAR and Architect for each product type for review and approval including illustrations from a qualified testing and inspecting agency that is applicable to each fire-resistive joint system configuration for construction and penetrating items.

D. (SD-10) Research/Evaluation Reports: For each type of fire-resistive joint system.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain fire-resistive joint systems for each kind of joint and construction condition indicated through one source from a single manufacturer.

B. Preconstruction Compatibility and Adhesion Testing: Submit to fire-resistive joint system manufacturers, for testing indicated below, samples of materials that will contact or affect fill materials.

1. Use manufacturer's standard test methods to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of fill materials to joint substrates.

a. Perform tests under environmental conditions replicating those that will exist during installation.

2. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
3. For materials failing tests, obtain fire-resistive joint system manufacturer's written instructions for corrective measures, including the use of specially formulated primers.

C. Fire-Test-Response Characteristics: Provide fire-resistive joint systems that comply with the following requirements and those specified in "Performance Requirements" Article:

1. Fire-resistance tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency is UL or another agency performing testing and follow-up inspection services for fire-resistive joint systems acceptable to authorities having jurisdiction.

2. Fire-resistive joint systems are identical to those tested per UL 2079. Provide rated systems complying with the following requirements:

   a. Fire-resistive joint system products bear classification marking of qualified testing and inspecting agency.
   b. Fire-resistive joint systems correspond to those indicated by referencing system designations listed by the following:

      1) UL in its "Fire Resistance Directory."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver fire-resistive joint system products to Project site in original, unopened containers or packages with qualified testing and inspecting agency's classification marking applicable to Project and with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life, curing time, and mixing instructions for multicomponent materials.

B. Store and handle materials for fire-resistive joint systems to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Ventilate fire-resistive joint systems per manufacturer's written instructions by natural means or, if this is inadequate, forced-air circulation.

1.8 COORDINATION

A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

B. Coordinate sizing of joints to accommodate fire-resistive joint systems.

C. Notify Owner's inspecting agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on days preceding each series of installations.

D. Do not cover up fire-resistive joint system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products specified.

1. Fire-Resistive Joint Systems:

a. 3M Fire Protection Products.
b. DAP Inc.
c. Firestop Systems Inc.
d. Hilti, Inc.
e. ISOLATEK International.
f. Nelson Firestop Products.
g. Tremco, Inc.
h. A/D Fire Protection Systems Inc.

2. Perimeter Fire-Containment Systems:

a. Specified Technologies Inc.
b. United States Gypsum Company.

2.2 FIRE-RESISTIVE JOINT SYSTEMS, GENERAL

A. Compatibility: Provide fire-resistive joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistive joint system manufacturer based on testing and field experience.

B. Accessories: Provide components of fire-resistive joint systems, including forming materials that are needed to install fill materials and to comply with Part 1 "Performance Requirements" Article. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing and inspecting agency for systems indicated.

2.3 FIRE-RESISTIVE JOINT SYSTEMS

A. Where UL-classified fire-resistive joint systems are indicated, they refer to alphanumeric designations listed in UL's "Fire Resistance Directory" under product Category XHBN.

2.4 PERIMETER FIRE-CONTAINMENT SYSTEMS

A. Where UL-classified perimeter fire-containment systems are indicated, they refer to alphanumeric designations listed in UL's "Fire Resistance Directory" under product Category XHDG.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:

1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from fire-resistive joint system materials. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates.

3.3 INSTALLATION

A. General: Install fire-resistive joint systems to comply with Part 1 "Performance Requirements" Article and fire-resistive joint system manufacturer's written installation instructions for products and applications indicated.

B. Install forming/packing/backing materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings and forming/packing/backing materials as required to achieve fire-resistance ratings indicated.
2. Apply fill materials so they contact and adhere to substrates formed by joints.
3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

A. Inspecting Agency: The Contractor shall engage a qualified independent inspecting agency to inspect fire-resistive joint systems and to prepare inspection reports.

1. Inspecting agency will state in each report whether inspected fire-resistive joint systems comply with or deviate from requirements.

B. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and inspecting agency has approved installed fire-resistive joint systems.

C. If deficiencies are found, repair or replace fire-resistive joint systems so they comply with requirements.

3.5 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to joints as Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION 07 84 20

SECTION 07 92 00 - JOINT SEALANTS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Application of sealants at control and expansion joints on exterior vertical and horizontal intersections to provide a water and airtight barrier, as specified below and as noted on drawings.

B. Application of specialty sealants and caulking as noted on drawings.

C. Associated materials and preparatory work to insure a successful sealant application.

1. Provide sealant adhesion tests during sealant application.

1.2 REFERENCES

A. ASTM C 920 – Standard Specification for Elastomeric Joint Sealants.

B. ASTM D 2240 – Standard Test Method for Rubber Property-Durometer Hardness.

C. ASTM C 1248 – Standard Test Method for Staining of Porous Substrate by Joint Sealants.

D. ASTM C 719 – Standard Test Method for Adhesion and Cohesion of Elastomeric Joint Sealants Under Cyclic Movement (Hockman Cycle).

E. ASTM D 412 – Standard Test Methods for Vulcanized Rubber and Thermoplastic Rubbers and Thermoplastic Elastomers–Tension.

F. ASTM C 834 – Standard Specification for Latex Sealants.

G. ASTM C 881 – Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete.

H. ASTM C 510 – Standard Test Method for Staining and Color Change of Single or Multi Component Joint Sealant.

I. Sealant, Waterproofing and Restoration Institute (SWRI) Sealant & Caulking Specification.

J. EIFS Industry Members Association (EIMA) Guide for use of Sealants with Exterior

Insulation and Finish Systems Class PB.

1.3 SUBMITTALS

A. (SD-01)(SD-02) Product Literature: Product data sheets, color charts, and manufacturer's installation instructions.

B. (SD-15) Samples: 2-inch cured sample of each chosen color and type of sealant.

C. (SD-12) Field Adhesion test.

1.4 QUALITY ASSURANCE

A. Compatibility with Substrate and Coatings:

1. Applicator shall be responsible for verifying with sealant manufacturer that sealants used are compatible with joint substrates and coatings to which sealants will come in contact.

2. Submit written certification from sealant manufacturer of acceptability for adhesion, staining, and compatibility with adjacent materials and finishes.

3. Schedule sufficient time for the conducting of field testing, certification of results and submission which will not cause a project delay.

B. Applicator shall be responsible for providing a completely sealed building and ensure that all exterior joints between surfaces are properly sealed.

1.5 FIELD QUALITY REQUIREMENTS

A. Selected sealant manufacturer shall conduct site visits throughout construction to perform random field adhesion pull tests.

1. Sealant manufacturer shall at a minimum perform 10 field adhesion tests for the initial 1,000 linear feet of sealant installed for each substrate type and one field adhesion test for each 1,000 linear feet installed thereafter for each substrate type.

2. Sealant contractor shall regularly perform sealant field adhesion tests and record all test results as part of a quality control plan.

1.6 MOCK-UP

A. Prior to installation of joint sealants, apply sealants to field constructed mock-ups to verify selections made in submittal process and to demonstrate aesthetic effects as

well as qualities of material execution.

B. Conduct sealant adhesion pull tests as part of mock-up assembly.

1.7 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing products specified in this Section with minimum 10 years experience.

B. Applicator and job foreman shall have minimum five years' experience on equivalent projects.

C. Use personnel specifically trained in proper application procedures that are thoroughly familiar with joint details shown on drawings and installation requirements as specified in this Section.

1.8 PRE-INSTALLATION CONFERENCE

A. Prior to installation of joint sealants, convene at project site to discuss application of joint sealants and related work. Attendees will include applicator, sealant manufacturer's technical representative, and applicators of related work, general contractor, and architect.

1.9 DELIVERY, STORAGE AND HANDLING

A. Deliver in manufacturer's original, unopened containers identifying each product specified, relating to product literature submitted.

B. Store in accordance with manufacturer's recommendation; take precautions to ensure material fitness when installed for design performance.

1.10 WARRANTY

A. Upon completion of the work, furnish a written and signed manufacturer's warranty against adhesive and cohesive failure of sealant and watertightness of sealed silicone joints for a period of twenty (20) years, and five (5) years for polyurethane sealant. This warranty shall certify the properties of the products affecting their performance and that the products are used in accordance with the recommendations of the manufacturer.

B. Provide a manufacturers 20-year non-staining warranty for silicone sealant.

C. (SD-14) The contractor shall submit the following written and signed document to the Architect for delivery to the Owner.

CONTRACTOR WARRANTY

The undersigned warrants all materials furnished and work performed in the installation of exterior sealant systems on the *ITB AP 21-21 CONSTRUCTION OF SATELLITE CONCOURSE "C"* will remain free from leaks and other defects for a period of five years extending from the date of completion and acceptance of the sealant system and agrees during that period to make all necessary repairs and replacement of defective work, and all other work, exclusive of contents and furnishings damaged thereby, without additional cost to the Owner. This warranty shall have no dollar limit and shall cover all labor and materials required for repairs and replacement.

_____	_____
General Contractor	Calk/Sealant Contractor
_____	_____
Signed	Signed
_____	_____
Title	Title

D. Temporary repairs may be made by the Owner to meet emergency conditions without invalidating either of these warranties.

E. The Contractor shall be responsible for damages to the building resulting from failure to prevent penetration of water during construction.

PART 2 - PRODUCTS

2.1 SILICONE SEALANTS (See schedule for application usage for each sealant type.)

A. Type 1: ASTM C 920; low modulus, one component, non-sag, neutral cure silicone.

1. Movement Capability: ASTM C 719; plus 100 percent to minus 50 percent; elongation, 1600% per ASTM D 412.

2. Service Temperature Range: Minus 20 to 160 degrees F.

3. Shore A Hardness Range: 15 – 20; ASTM D 2240.

4. Staining: None; ASTM C 1248.

5. Manufacturers: Dow Corning Corp. 790.

B. Type 2: ASTM C 920; intermediate modulus, one component, non-sag, neutral cure silicone.

1. Movement Capability: Plus or minus 50 percent.

2. Service Temperature Range: Minus 40 to 300 degrees F.

3. Shore A Hardness Range: 30; ASTM D 2240.

4. Staining: None; ASTM C 510.

5. Manufacturers: Dow Corning Corp. 795, 995.

C. Type 3: ASTM C 920; high modulus, one component, non-sag, acetoxy cure silicone.

1. Movement Capability: Plus or minus 25 percent.

2. Service Temperature Range: Minus 35 to 140 degrees F.

3. Shore A Hardness Range: 23; ASTM D 2240.

4. Manufacturers: Dow Corning Corp. 999A; Pecora 863; GE 1200.

D. Type 4: ASTM C 920; medium modulus, one component, non-sag, neutral cure silicone.

1. Movement Capability: Plus or minus 50 percent.

2. Service Temperature Range: Minus 20 to 120 degrees F.

3. Shore A Hardness Range: 25 – 30; ASTM D 2240.

4. Staining: None; ASTM C 1248.

5. Manufacturers: Dow Corning Corp. 791; GE Silpruf.

E. Type 5: ASTM C 920; one component, self-leveling, fuel resistant, low modulus silicone.

1. Movement Capability: Plus 100, minus 50 percent.

2. Service Temperature Range: Minus 20 to 160 degrees F.

3. Shore A Hardness Range: 15 – 20; ASTM D 2240.

4. Manufacturers: Dow Corning Parking Structure Self Leveling.

F. Type 6: ASTM C 920; one component, non-sag, sanitary silicone sealant.

1. Movement Capability: Plus or minus 25 percent.

2. Shore A Hardness Range: 20 – 20; ASTM D 2240.

3. Manufacturers: Dow Corning Corp. 786, GE 1700, Percora 898.

2.2 POLYURETHANE SEALANTS

A. Type 7: ASTM C 920; medium modulus, two components, non-sag, polyurethane.

1. Movement Capability: Plus or minus 50 percent.

2. Service Temperature Range: Minus 20 to 120 degrees F.

3. Shore A Hardness Range: 20 – 40; ASTM D 2240.

4. Manufacturers: Sika Corporation, Sikaflex 2c; Tremco, Dymeric 241, Pecora, Dynatrol II.

B. Type 8: ASTM C 920; low modulus, one component, non-sag, polyurethane.

1. Movement Capability: Plus or minus 50 percent.

2. Service Temperature Range: Minus 20 to 120 degrees F.

3. Shore A Hardness Range: 25 – 25; ASTM D 2240.

4. Manufacturers: Tremco, Vulkem 921, Sika Corporation, Sikaflex 15LM.

2.3 SPECIALTY SEALANTS

A. Type 9: Semi rigid, two component, epoxy joint filler.

1. Movement Capability: N/A, designed for non-moving floor joints.

2. Service Temperature Range: 40 to 120 degrees F.

3. Shore A Hardness Range: 50 - 75; ASTM D 2240.

4. Manufacturers: Euclid Chemical, Euco 700, Sika Corporation, Sikadur CJR LPL.

B. Type 10: ASTM C 881; two component (security area) pick proof epoxy sealant.

1. Service Temperature Range: 40 to 120 degrees F.

2. Manufacturers: Sika, Sikadur 23 Lo-Mod Gel.

C. Type 11: ASTM C 920; Polyurethane security sealant.

1. Movement Capability: Plus or minus 12.5 percent.

2. Service Temperature Range: Minus 20 to 120 degrees F.

3. Shore A Hardness Range: 49 – 60; ASTM D 2240.

4. Manufacturers: Pecora Corporation, Dynaflex; Sika Corporation, Sikaflex TR.

2.4 ACOUSTICAL SEALANT

A. Type 12: ASTM C 834; single component, modified butyl.

1. Non-Hardening, Non-Drying, Non-Bleeding.

2. Unexposed joints only.

3. Manufacturers: Pecora, BA-98 Acoustical Sealant; Tremco, Tremco Acoustical Sealant.

2.5 CAULKING

A. Type 13: ASTM C 834; Acrylic latex caulking compound with silicone.

1. Movement Capability: Plus or minus 7.5 percent.

2. Manufacturers: Pecora, AC-20+Silicone; Tremco, Tremflex 834.

2.6 PRIMERS

A. Comply with manufacturer's instructions. Manufacturer shall be consulted for all surfaces not specifically covered in submitted application instructions.

2.7 BACKER ROD - TAPE

A. Closed-cell polyethylene; open-cell polyurethane; or non gassing, open-cell polyethylene soft-type backer rod as recommended by sealant manufacturer. Bond breaker tape shall be used to prevent three-sided adhesion in locations where backer rod cannot be used.

B. Acceptable Manufacturers:

1. Closed-Cell: ITP, Standard Backer Rod; Nomaco Standard Backer Rod.

2. Open-Cell: Denver Foam; ITP Tundra Foam; Nomaco.

3. Soft-Type: ITP Soft-type; Nomaco Soft-rod.

4. Bond Breaker Tape: Pecora Corp.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrate surfaces to ensure no bond breaker materials contaminate surface to which sealant is to adhere, and that unsound substrates are repaired.

B. Verify joint dimensions are within manufacturer's acceptable tolerances, per manufacturer's submittal literature.

3.2 PREPARATION

A. Protect adjacent exposed surfaces.

B. Prepare joints in accordance with manufacturer's recommended instructions for maximum adhesion; prime as required by manufacturer.

C. Consult manufacturer for surfaces not specifically covered in application instructions.

D. Installation of sealant shall be evidence of acceptance of substrate.

3.3 INSTALLATION: GENERAL.

A. Both temperature and dampness conditions may restrict application of these

sealants. Comply with manufacturer's instructions.

B. Sealant shall be mixed (if multi-component) and installed in accordance with manufacturers' recommendations and instructions to ensure complete mixing and an installed proper width/depth ratio with maximum adhesion contact. Prevent three-sided adhesion.

3.4 BACKER ROD INSTALLATION

A. Backer rod shall be installed using only blunt or rounded tools which will ensure a uniform (+ or – 1/8") depth without puncturing the material. Backer rod shall be a minimum of 33% oversized for closed cell or soft rod and a minimum of 50% oversized for open cell backer rod, unless otherwise required by the manufacturer.

B. Set backer rod at proper depth in the joint. Do not leave voids or gaps between the ends of joint filler.

3.5 SEALANT INSTALLATION

A. Deposit sealants in uniform, continuous ribbons without gaps with complete "wetting" of the joint bond surfaces equally on opposite sides. Fill sealant joint to a slightly concave surface, slightly below adjoining surfaces.

B. Joint Size and Shape: Install sealants to depths recommended by sealant manufacturer. Fill joints to a depth equal to 50% of joint width, but no more than 50% of joint width, but nor more than ½-inch deep nor less than ¼-inch deep.

C. Finished bead shall be smooth, free from wrinkles, air pockets, and foreign matter.

3.6 CLEANING

A. Remove excess material adjacent to joint.

B. Remove unused materials from jobsite.

3.7 SCHEDULE

JOINT TYPE	SEALANT TYPE												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Structural Glazing		X											
Glass to Glass (Non Structural)			X	X									
Perimeter Window Sealant		X		X									
Aluminum to Brick	X			X									
Brick to Brick	X						X						
Wood to Wood				X				X					
Metal to Metal		X		X									
Metal to Stucco				X									
Aluminum to Concrete	X			X									
Concrete to Concrete	X												
Aluminum to Plaster	X												
Stone to Stone	X												
Aluminum to EIFS (Note)				X									
EIFS to EIFS (Note)	X			X									
Paving on Grade					X								
Interior Caulking													X
Sanitary Sealant						X							
Warehouse Floor Control Joints									X				
Pick Proof Security Joints										X			
Tamper Proof Security Joints											X		
Interior Acoustical Joints												X	

Note: Consult Sealant and EIFS manufacturers for suitability of sealant to specific EIFS system.

END OF SECTION 07 92 00

SECTION 08 10 00 - STEEL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. The General Provisions of the Contract, including General and Supplementary Conditions and General Requirements apply to the work specified in this section.

B. Section 04 22 00, “Concrete Unit Masonry”
C. Section 06 22 00, “Millwork”
D. Section 08 71 00, “Door Hardware and Schedule”
E. Section 09 21 16, "Gypsum Drywall"
F. Section 09 91 00, "Painting”
G. Division 28, “ELECTRONIC SAFETY AND SECURITY”

1.2 DESCRIPTION OF WORK

A. The extent of standard steel door frames and doors as shown on drawings, schedules specified herein.

1.3 QUALITY ASSURANCE:

A. Provide standard steel door frames manufactured by a single firm specializing in production of this type of work, unless otherwise acceptable to Architect.

B. Fabricate side panels and transom panels to match door frames in all respects, unless otherwise indicated.

C. Provide frames complying with the Steel Door Institute "Recommended Specifications, Standard Steel Doors and Frames" (SDI-100). All frame joints shall be shop-welded and primed.

D. Security Test – ASTM 476

E. At exterior provide doors and door frames that comply with the Florida Building Code 2017-Product Approval System for 150 mph 3-second gust.

1.4 FIRE-RATED ASSEMBLIES

A. Where fire-resistance classification is shown, scheduled, or specified for steel frames and doors, provide fire-rated frames and doors investigated and tested as a fire door assembly, complete with type of hardware to be used. Identify each fire door frame with recognized testing laboratory labels, indicating applicable fire rating of steel frames.

B. Construct and install assemblies to comply with N.F.P.A. Standard No. 80, and as herein specified.

1.5 SUBMITTALS

A. See Section 01 33 23, "Shop drawings, Product Data and Samples".

B. Product Data - Standard Steel Door Frames and Doors.

C. Submit copies manufacturer's product data for fabrication and installation instructions.

D. Shop Drawings - Standard Steel Door Frames and Doors.

E. Submit copies of shop drawings for fabrication and installation of steel doors and frames. Include details of each frame type, elevations of door design types, conditions at openings, details of construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections. Show anchorage and accessory items.

F. Provide schedule of doors and frames using same reference numbers for details and openings as those on contract drawings.

G. Provide product approval documents, certification, test reports that verify compliance with the requirements set forth in the Florida Building Code Product Approval System for exterior doors and door frames.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow metal work cartooned or crated to provide protection during transit and job storage.

B. Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provided finish items are equal in all respects to new work and acceptable to Architect; otherwise, remove, and replace damaged items as directed.

C. Store frames at building site under cover. Place units on at least 4" high wood sills or on the floors in a manner that will prevent rust and damage. Avoid use of non-vented plastic or canvas shelters which could create a humidity chamber. If cardboard wrapper on door becomes wet, remove carton immediately. Provide a 1/4" space between stacked doors to promote air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Amweld

B. Ceco Corp.

C. Steelcraft

D. Or approved substitution.

2.2 PRODUCTS

A. Provide metal doors of type and styles indicated on the drawings and schedules and complying with SDI 100 for minimum materials, requirements, Type II Heavy-Duty, Style 4 seamless construction.

1. 14-gauge steel, extra heavy-duty door insulated core, galvanized, doors.

2. 14-gauge steel, extra heavy-duty galvanized frame.

3. UL listed as doors and door frames for a one- and two-hour rated wall door opening.

4. Door and frame, assembly grade 40, based on ASTM 476.

5. Door and frame, assembly certified to meet the Florida Building Code Product Approval System.

6. Jamb depth: As shown on drawings.

7. Jamb anchors: Masonry, five (5) through bolt frame anchors at each Jamb, UL label. and product approval.

8. Fill Jambs solid with Grout at masonry openings.

9. Door size: As shown on drawings.

10. Provide galvanized door frames and doors at exterior locations and non-HVAC areas.

11. All exterior wall shall have a Florida Product approval in compliance with exposure and pressures noted on Structural Drawing Diagram and Schedules.

12. All exterior wall doors shall have an insulated core.

2.3 MATERIALS

A. Hot-Rolled Steel Sheets and Strip:

B. Commercial quality carbon steel, pickled and oiled, complying with ASTM A569 and ASTM A568.

C. Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A366, and ASTM A568.

D. Galvanized Steel Sheets: Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A526, with ASTM A525, G60 zinc coating, mil phosphatized.

E. Supports and Anchors:

1. Fabricate of not less than 14-gauge galvanized sheet steel.

2. Inserts, Bolts, and Fasteners: Manufacturer's standard units, except hot-dip galvanize items to be built into exterior walls, complying with ASTM A153, Class C or D as applicable.

3. Comply with Florida Building Code, product approval requirements for detail installation and the wind pressure, exposure as noted on Structural Drawing Diagram and Schedules.

F. Shop-Applied Paint: For steel surfaces, use rust-inhibitive enamel or paint, air-drying or baking, suitable as a base for specified finish paints.

G. Surface Filler: F.S. TT-F-3220 (1), two-component type or MIL-F-52252.

2.4 FABRICATION - GENERAL

A. Fabricate steel frame units to be rigid, neat in appearance and free from defects, warp or buckle. Wherever practicable, fit and assemble units in manufacturer's plant all joints welded. Clearly identify work that cannot be permanently factory-assembled before shipment to assure proper assembly at project site.

B. Fabricate frames, concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold-rolled or hot-rolled steel.

C. Fabricate all interior frames from galvanized sheet steel.

D. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat Phillips heads for exposed screws and bolts.

E. Finish Hardware Preparation:

1. Prepare hollow metal units to receive finish hardware, including cutouts, reinforcing, drilling and tapping in accordance with final Finish Hardware Schedule and templates provided by hardware supplier.

2. Reinforce hollow metal units to receive surface- applied and or recessed hardware.

3. Prepare hollow metal units with internal rated raceways for power and access control to Mortise locks, and panic devices.

2.5 STEEL FRAMES

A. Provide primed metal frames of the types and styles indicated on drawings or schedules and complying with S.D.I.-100 for minimum materials and construction requirements.

B. Fabricate frames of welded construction for all applications.

C. Comply with Florida Building Code, for three second gust, wind load requirements or as noted on the Structural Wind Diagram and Schedule.

D. Door Silencers: Drill stops to receive two (2) silencers on strike jambs of single-swing frames and two (2) silencers on head of double-swing frames.

E. Plaster Guards: Provide 26-gauge steel plaster guards or mortar boxes, welded to frame, at back of finish hardware cutouts where mortar or other materials might obstruct hardware operation.

F. Prepare frames door and doors with UL listed power concealed raceways.

G. Prepare frames for electric transfer (EPT) on hinge side of frame.

PART 3 - EXECUTION

3.1 INSPECTION

A. Installer must examine substrate and conditions under which steel doors and frames are to be installed and notify the Contractor in writing of any conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION

A. General: Install hollow metal units and accessories in accordance with final shop drawings and manufacturer's data, and as herein specified.

B. Placing Frames: Comply with the provisions of SDI-105 "Recommended Erection Instructions for Steel Frames" and South Florida Building Code approvals for tested installation.

C. Place frames prior to construction of enclosing walls and ceilings. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders leaving surfaces smooth and undamaged.

D. Install fire-rate frames in accordance with N.F.P.A. Standard No. 80.

E. Install per approved tested assembly which complies with the Florida Building Code Product Approval System, not less than five (5) wall anchors per jamb.

F. Drill holes in masonry above the head frame to allow grouting of door jambs after anchors are in place.

G. Place and fill jambs solid with grout.

3.3 DOOR INSTALLATION

A. Fit hollow metal doors accurately in their respective frames, within clearances in SDI-100.

B. Place fire-rated doors with clearances as specified in NFPA standard No. 80. “ DO NOT PAINT OVER UL LABLE ON DOOR AND DOOR FRAMES”.

3.4 FINISH HARDWARE

A. See Section 08 71 00, “Door Hardware”.

3.5 ACCESS CONTROL

A. See Section 28 13 00, “Physical Access Control System (PACS)”

3.6 ADJUST AND CLEAN

A. Final Adjustments: Check and readjust operating finish hardware items in hollow metal work prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors and frames which are warped, bowed or otherwise damaged.

B. Prime Coat Touch-Up: Immediately after erection, sand smooth any rusted or damaged areas of prime coat and apply touch-up of compatible air-drying primer.

END OF SECTION 08 10 00

SECTION 08 31 13- ACCESS DOORS AND FRAMES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and General conditions provisions of the contract including contractual conditions, and division 1 specifications.

1.02 SUMMARY

A. This Section includes the following types of access doors:

1. Wall access doors.
2. Fire-rated wall access doors.
3. Ceiling access doors.
4. Fire-rated ceiling access doors.
5. Floor access doors.

B. This Section includes all access doors to the extent required by code:

1. Electrical Junction and pull boxes.
2. Communications, data, alarm, security, low voltage, CCTV junction, control and pull boxes
3. Access to mechanical equipment for maintenance and replacement.
4. Access to mechanical duct dampers.
5. Plumbing valves, devices, and cleanouts.
6. Fire Protection valves and devices.
7. Install Access doors required by code even if not shown on drawings. Access doors will be required to be installed through-out the project to comply with Code requirement for access.

1.03 SUBMITTALS

A. (SD-01)(SD-02) Product Data: For each type of access door assembly specified, including details of construction relative to materials, individual components, profiles, finishes, and fire-protection ratings (if required).

B. (SD-07) Include complete schedule: including types, general locations, sizes, wall and ceiling construction details, latching or locking provisions, and other data pertinent to installation.

C. (SD-04) Shop Drawings: Showing fabrication and installation of customized access doors and frames, including details of each frame type, elevations of door design types, anchorage, and accessory items.

1.04 QUALITY ASSURANCE

A. Single-Source Responsibility: Obtain access doors for entire Project from one source and by a single manufacturer.

B. Fire-Rated Door Assemblies: Units that comply with NFPA 80, are identical to door and frame assemblies tested for fire-test-response characteristics per test method as indicated below, and are labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.

1. Test Method for Vertical Installations: ASTM E 152.

2. Test Method for Horizontal Installations: ASTM E 119.

C. Size Variations: Obtain Architect's acceptance of manufacturer's standard size units, which may vary slightly from sizes indicated.

1.05 COORDINATION

A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed equipment, and indicate on schedule specified under "Submittals" Article.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. Bilco
2. J.L. Industries.
3. Karp Associates, Inc.
4. Milcor, Inc.
5. Nystrom, Inc.

2.02 MATERIALS

A. Steel Sheet: ASTM A 366 commercial-quality, cold-rolled steel sheet with baked-on, rust-inhibitive primer.

2.03 ACCESS DOORS

A. Insulated, Fire-Rated Access Doors: Self-latching units consisting of frame, trim, door, insulation, and hardware, including automatic closer, interior latch release, and complying with the following requirements:

1. Trimless Frame: Perimeter frame complying with the following requirements:

a. Metal: 0.0598-inch- thick steel sheet.

b. Frame Configuration: Flange integral with frame and overlapping face of adjoining gypsum board, with surface formed to receive joint compound.

2. Door: 0.0359-inch- thick steel sheet, welded pan type.

3. Hinges: Continuous type.

4. Keyed Latches: Bolt type, operated by flush key device, keyed to match building system. See Section 08 71 02 Door Hardware and Schedule.

5. Insulation: 2-inch- thick mineral-fiber insulation.

6. Fire-Protection Rating for Walls and Ceilings: 1 and 2 hours with UL listing and Label.

B. Noninsulated, Fire-Rated Doors for Walls: Self-latching units consisting of frame, trim, door, and hardware, including automatic closer, interior latch release, and complying with the following requirements:

1. Frame: 0.0598-inch- thick steel sheet.

2. Door: 0.0598-inch- thick steel sheet.

3. Hinge: Continuous type.

4. Keyed Latches: Key opens and closes Access Door, keyed to match building system. See Section 08 71 02 Door Hardware and Schedule.

5. Fire-Protection Rating for Walls: 1 and 2 hour UL listed and labled.

C. Trimless, Flush Access Doors for Gypsum Board: Units consisting of frame, concealed edge trim, door, hardware, and complying with the following requirements:

1. Frame: 0.0598-inch- thick steel sheet.

2. Door: 0.0747-inch- thick steel sheet.

3. Concealed, Gypsum Board Edge Trim: 0.0299-inch zinc-coated or galvanized-steel sheet with face flange formed to receive joint compound.

4. Hinge: Concealed spring pin or continuous type.

5. Keyed Latches: Key opens and closes Access Door, keyed to match building system. See Section 08 71 02 Door Hardware and Schedule.

D. Trimless, Flush Access Doors for Concrete Slab: Units consisting of frame, concealed edge trim, door, hardware, and complying with the following requirements:

1. Frame: 0.25-inch- thick aluminum channel (drainable).

2. Door: 0.25-inch- thick aluminum diamond plate.

3. Frame areas in contact with concrete coated with bituminous paint.

4. Hinge: Concealed spring pin or continuous type stainless steel.

5. Keyed Latches: Key opens and closes Access Door, keyed to match building system. See Section 08 71 02 Door Hardware and Schedule.

6. Basis of Design: Bilco J-1AL

2.04 FABRICATION

A. General: Manufacture each access door assembly as an integral unit ready for installation.

B. Steel Access Doors and Frames: Continuous welded construction. Grind welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.

1. Exposed Flange: Nominal 1 to 1-1/2 inches wide around perimeter of frame.

2. For gypsum board assemblies or gypsum veneer plaster, furnish frames with edge trim for gypsum board or gypsum base.

3. For installation in masonry construction, furnish frames with adjustable metal masonry anchors.

C. Locking Devices: Furnish number required to hold door in flush, smooth plane when closed.

1. For cylinder lock, furnish 2 keys per lock and key all locks alike. See Section 0876102 Door Hardware for ‘Best” Cylinder and lock system requirements.

PART 3 EXECUTION

3.01 PREPARATION

A. Advise Installers of other work about specific requirements relating to access door installation, including sizes of openings to receive access door and frame, as well as locations of supports, inserts, and anchoring devices. Furnish inserts and anchoring devices for access doors that must be built into other construction. Coordinate delivery with other work to avoid delay.

3.02 INSTALLATION

A. General: Comply with manufacturer's instructions for installing access doors.
1. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finished surfaces.
2. Paint exposed surface of access doors and frames to match adjacent surface finish.

B. Install Access doors at all locations as required by code coordinate with other trades which require doors for access for location, type and size.

3.03 ADJUST AND CLEAN
A. Adjust hardware and panels after installation for proper operation.
B. Remove and replace panels or frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08 31 13

SECTION 08 42 29 - AUTOMATIC ENTRANCES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes bi-parting sliding, with fixed sidelights

1.2 DEFINITIONS

A. Automatic entrance doors consist of the manufacturer's assembled automatic entrance door units including entrance doors and frames, door operator controls, powered door operators, and accessories.

B. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.

C. Safety Device: Device that prevents a door from opening or closing, as appropriate.

1.3 RELATED SECTIONS

A. Section 03 30 00, “Cast in Place Concrete”

B. Section 04 22 00, “Concrete Unit Masonry “

C. Section 08 71 00, “Door Hardware and Schedule”

D. Section 08 80 00, “Glazing”

E. Division 26- ELECTRICAL

F. Division 28-ELCTRONIC SAFETY AND SECURITY

1.4 PERFORMANCE REQUIREMENTS

A. Opening-Force Requirements for Egress Doors: Not more than 50 lbf required to manually set door in motion in the direction of egress if power fails, and not more than 15 lbf required to open door to minimum required width.

B. Closing-Force Requirements: Not more than 30 lbf required to prevent door from closing.

1.5 SUBMITTALS

A. (SD-01)(SD-02) Product data:

1. Data on operators, hardware, and accessories
2. Roughing-in diagrams
3. Parts lists
4. Data on finishes and recommendations for maintenance and cleaning of exterior surfaces

B. (SD-04) Shop drawings:

1. Layout and installation details, including relationship to adjacent work.

2. Elevations at 1/4-inch scale.
3. Detail sections of typical composite members.
4. Anchors and reinforcement.
5. Hardware mounting heights.
6. Provisions for expansion and contraction.
7. Glazing details.
8. Shop drawings shall be signed and sealed by a licensed engineer registered in the State of Florida.

C. (SD-05) Wiring diagrams detailing wiring for power operator, signal, switch sensors, and control systems differentiating clearly between manufacturer-installed wiring and field-installed wiring.

D. (SD-07) Hardware Schedule: Submit complete hardware schedule for automatic entrance doors organized into sets based on hardware specified. Coordinate hardware with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish. Coordinate hardware for automatic entrance doors with hardware required for the rest of the Project. Include name of the item and the manufacturer and complete designations of every item required for each entrance. If hardware is not specified, provide locks that latch & secure group that are comparable with Russwin-Corbin with removeable core. See Section 087102 Door Hardware for core requirements.

E. (SD-13) Installers Certification from the AAADM

F. (SD-20) Maintenance Data: Submit manufacturer's maintenance and service data for door operators and control system including the name, address and telephone number of the nearest authorized service representative.

1. Provide spare parts list
2. Glass maintenance instructions

G. (SD-14) Sample warranty

H. (SD-13) Florida Product Approval documents

1.6 QUALITY ASSURANCE

A. Installer Qualifications: For installation of the automatic entrance doors, engage an experienced Installer who is an authorized representative of the manufacturer for both the installation and maintenance of the type of units required for this Project. Installer shall also be certified by the Association of Automatic Door Manufacturers (AAADM).

1. Maintenance Proximity: The Installer shall maintain offices and repair or service facilities not more than 2 hours normal travel time from the Project site.

B. Manufacturer's Qualifications: Provide automatic entrance doors produced by a firm experienced in manufacturing systems that are similar to those indicated for this Project and that have a record of successful in-service performance on not less than 10 years.

C. Company specializing in manufacturing the products specified in this section shall have minimum ten years experience and be a member of the American Association of Automatic Door Manufacturers (AAADM). A completed AAADM compliance form shall be submitted as proof of compliance with ANSI A156.10 Standard for power operated pedestrian doors. Door(s) shall be inspected and form shall be signed by an AAADM certified inspector prior to placing door(s) in operation.

D. Source Limitations: Obtain automatic entrance assemblies through one source from a single manufacturer.

E. UL Standard: Provide powered door operators that comply with UL 325.

F. Design Criteria: The drawings indicate the size, profile and dimensional requirements of automatic entrance doors required and are based on the specific types and models indicated. Automatic entrance doors by other manufacturers may be considered provided deviations in dimensions and profiles are minor and do not change the design concept as judged by the Architect. The burden of proof of equality is on the proposer.

G. Emergency Exit Doors: Automatic entrance doors serving as a required means of egress shall comply with requirements of authorities having jurisdiction. Provide manufacturer's certification that doors comply with these requirements.

1.7 PROJECT CONDITIONS

A. Field Measurements: General Contractor shall verify openings to receive automatic entrance door assemblies by field measurements before fabrication and indicate measurements on Shop Drawings.

B. Mounting Surfaces: General Contractor shall verify all surfaces to be plumb, straight and secure; substrates to be of proper dimension and material.

C. Other trades: General Contractor shall advise of any inadequate conditions or equipment.

1.8 COORDINATION

A. Templates: Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing automatic entrances to comply with indicated requirements.

B. Electrical System Roughing-in: Coordinate layout and installation of automatic entrance door assemblies with connections to power supplies.

1. Coordinate signaling device for BAS, signaling when door is stuck in the open or break-open position.

1.9 WARRANTY

A. Automatic Entrances shall be free of defects in material and workmanship for a period of one (1) year from the date of substantial completion.

B. During the warranty period the Owner shall engage a factory-trained technician to perform service and affect repairs. A safety inspection shall be performed after each adjustment or repair and a completed inspection form shall be submitted to the Owner.

C. During the warranty period all warranty work, including but not limited to emergency service, shall be performed during normal working hours.

1.10 FLORIDA PRODUCT APPROVAL

A. Door shall have a Florida Product approval meeting the Structural load requirements noted on Drawing Diagram and Schedule.

1.11 FLORIDA ACCESSIBILITY CODE FOR BUILDING CONSTRUCTION

A. Sliding door assembly shall conform with the Accessibility Requirements Manual from the Florida Department of Community Affairs, Florida Board of Building Codes and Standards Latest Edition.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design:

1. Stanley Access Technologies; Dura Storm Series 3000, SGD. Florida Product approval FL 23979.1

B. Products of the following manufacturers may be considered provided they equal or exceed the material requirements and design qualities of the specified product. Submit requests for Architect's approval with complete technical data for evaluation.

1. Or Approved Substitution

2.2 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Headers, stiles, rails, and frames: 6063-T6.
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
3. Sheet and Plate: ASTM B 209.

B. Sealants and Joint Fillers: Performed under Division 7 Section "Joint Protection".

2.3 AUTOMATIC ENTRANCE DOOR ASSEMBLIES

A. General: Provide manufacturer's standard automatic entrance door assemblies including doors, sidelights, framing, headers, carrier assemblies, roller tracks, door operators, activation and safety devices, and accessories required for a complete installation.

B. Sliding Automatic Entrances:

1. Configuration: Two sliding leaves and two full sidelights.
2. Traffic Pattern: Two-way.
3. Emergency Breakaway Capability: Sliding leaves.
4. Mounting: Between jambs.

2.4 COMPONENTS

A. Framing Members: Manufacturer's standard extruded aluminum reinforced as required to support imposed loads.

1. Nominal Size: 1 3/4 inch by 6 inch.
2. Concealed Fastening: Framing shall incorporate a concealed fastening pocket, and continuous flush insert cover, extending full length of each framing member.

B. Stile and Rail Doors and Sidelights: Manufacturer's standard 1 3/4 inch thick glazed doors with extruded-aluminum tubular stile and rail members. All door corners, including intersections of stiles and rails or stiles and muntin bars, shall be welded secure.

1. Glazing Stops and Gaskets: Snap-on, extruded-security aluminum inboard stops with preformed glazing gaskets. Mechanically fastened outboard gutter stop with approved structural glazing tape.

2. Entrances with width exceeding 168 inches and height exceeding 96 inches:

a. Stile Design: Medium stile; 3 1/2 inch nominal width.
b. Bottom Rail Design: Minimum 10 inch nominal height.
c. Muntin Bars: Horizontal tubular rail member for each door; 8 1/2 inch nominal nominal height.

C. Glazing: Performed under Division 8 Section “Glazing” in accordance with product approvals and the following:

1. Glass: 5/8” inch impact rated glass. Tinted to match tint of curtain wall glass.
2. Glazing: Outboard stop with approved structural tape.

D. Headers: Fabricated from extruded aluminum and extending full width of automatic entrance door units to conceal door operators, carrier assemblies, and roller tracks. Provide hinged or removable access panels for service and adjustment of door operators and controls. Secure panels to prevent unauthorized access.

1. Mounting: Concealed, with one side of header flush with framing.
2. Capacity: Capable of supporting up to 220 lb per panel, up to four panels, over spans up to 14 (Fourteen) feet without intermediate supports.

E. Carrier Assemblies and Overhead Roller Tracks: Manufacturer's standard carrier assembly that allows vertical adjustment of at least 1/8 inch; consisting of urethane with precision steel lubricated ball-bearing wheels, operating on a continuous roller track. Support panels from carrier assembly by load wheels and anti-riser wheels with factory adjusted cantilever and pivot assembly. Minimum two ball-bearing load wheels and two anti-rise rollers for each active leaf. Minimum load wheel diameter shall be 2 1/2 inch; minimum anti-rise roller diameter shall be 2 inch.

F. Thresholds: Manufacturer's standard thresholds as indicated below:

1. Where scheduled, continuous standard tapered extrusion with integrated guide, Continuous Standard tapered extrusion double bevel.

2. Where scheduled, continuous standard tapered extrusion with integrated guide, double bevel.
3. Comply with ADA requirements 1/2" max threshold height.

G. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.

H. Signage: Provide signage in accordance with ANSI/BHMA A156.10.

2.5 DOOR OPERATORS

A. General: Provide door operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, operation under normal traffic load for type of occupancy indicated.

B. Electromechanical Operators: Self-contained overhead unit powered by a minimum of one 1/4 horsepower, permanent-magnet DC motor with gear reduction drive, microprocessor controller; and encoder.

1. Operation: Power opening and power closing.
2. Operators: Provide two 1/4 horsepower motors for automatic entrances with width exceeding 168 inches, or height exceeding 96 inches.
3. Features:

a. Adjustable opening and closing speeds.
b. Adjustable latch-check and back-check.
c. Adjustable acceleration and braking.
d. Adjustable hold-open time between 0 and 30 seconds.
e. Obstruction recycle.
f. On/Off switch to control electric power to operator.
g. Energy conservation switch that reduces door-opening width.
h. Closed loop speed control with active braking and acceleration.
i. Adjustable obstruction recycle time delay.
j. Self adjusting stop position.
k. Self adjusting closing compression force.
l. Onboard sensor power supply.
m. Onboard sensor monitoring.
n. Switch to open/Switch to close operation.

4. Mounting: Concealed.
5. Drive System: Synchronous belt type.

C. Electrical service to door operators shall be provided under Division 16 Electrical. Minimum service to be 115 VAC, 5 amps.

2.6 ELECTRICAL CONTROLS

A. Electrical Control System: Electrical control system shall include a microprocessor controller and position encoder. The encoder shall monitor revolutions of the operator shaft and send signals to microprocessor controller to define door position and speed.

Systems utilizing external magnets and magnetic switches are not acceptable. A single controller shall be capable of controlling up to 2 operators per entrance system.

B. Performance Data: The microprocessor shall collect and store performance data as follows:

1. Counter: A non-resettable counter to track operating cycles.
2. Event Reporting: Unit shall include event and error recording including number of occurrences of events and errors, and cycle count of most recent events and errors.
3. LED Display: Display presenting the current operating state of the controller.

C. Controller Protection: The microprocessor controller shall incorporate the following features to ensure trouble free operation:

1. Automatic Reset Upon Power Up.
2. Main Fuse Protection.
3. Electronic Surge Protection.
4. Internal Power Supply Protection.
5. Auto-Resetting sensor supply protection.
6. Motor Protection, over-current protection.

D. Soft Start/Stop: A “soft-start” “soft-stop” motor driving circuit shall be provided for smooth normal opening and recycling.

E. Obstruction Recycle: Provide system to recycle the sliding panels when an obstruction is encountered during the closing cycle. If an obstruction is detected, the system shall search for that object on the next closing cycle by reducing door closing speed prior to the previously encountered obstruction location, and will continue to close in check speed until doors are fully closed, at which time the doors will reset to normal speed. If obstruction is encountered again, the door will come to a full stop. The doors shall remain stopped until obstruction is removed and operate signal is given, resetting the door to normal operation.

F. Programmable Controller: Microprocessor controller shall be programmable via standard push button controls, or by connection to a local configuration tool. Local configuration tool shall be a software driven handheld interface. The following parameters may be adjusted via the configuration tool.

1. Operating speeds and forces as required to meet ANSI/BHMA A156.10.
2. Adjustable and variable features as specified.
3. Reduced opening position.
4. Fail Safe/Secure control.
5. Firmware update.
6. Trouble Shooting
   a. I/O Status.
   b. Electrical component monitoring including parameter summary.
7. Software for local configuration tool shall be available as a free download from the sliding automatic entrance manufacturer’s internet site. Software shall be

compatible with the following operating system platforms: Palm®, Android®, and Windows Mobile®.

2.7 ACTIVATION AND SAFETY DEVICES

A. Motion Sensors: Motion sensors shall be mounted on each side of door header to detect pedestrians in the activating zone, and to provide a signal to open doors in accordance with ANSI/BHMA A156.10. Units shall be programmable for bi-directional or uni-directional operation and shall incorporate K-band microwave frequency to detect all motion in both directions.

B. Presence Sensors: Presence sensors shall be provided to sense people or objects in the threshold safety zone in accordance with ANSI/BHMA A156.10. Units shall be self-contained, fully adjustable, and shall function accordingly with motion sensors provided. The sensor shall be enabled simultaneously with the door-opening signal and shall emit an elliptical shaped infrared presence zone, centered on the doorway threshold line. Presence sensors shall be capable of selectively retuning to adjust for objects which may enter the safety zone; tuning out, or disregarding, the presence of small nuisance objects and not tuning out large objects regardless of the time the object is present in the safety zone. The door shall close only after all sensors detect a clear surveillance field.

C. Photoelectric Beams: In addition to the threshold sensor include a minimum of two (2) doorway holding beams. Photoelectric beams shall be pulsed infrared type, including sender receiver assemblies for recessed mounting. Beams shall be monitored by electrical controls for faults and shall fail safe.

2.8 HARDWARE

A. General: Provide units in sizes and types recommended by automatic entrance door and hardware manufacturers for entrances and uses indicated.

B. Emergency Breakaway Feature: Provide release hardware that allows panel(s) to swing out in direction of egress to full 90 degrees from any position in sliding mode. Maximum force to open panel shall be 50 lbf according to ANSI/BHMA A156.10. Interrupt powered operation of panel operator while in breakaway mode.

1. Emergency breakaway feature shall include at least two adjustable detent devices mounted in each breakaway panel; one top mounted and one bottom mounted, to control panel breakaway force.
2. Wind Resistant Damper: Provide factory installed concealed gas dampers in each non-sliding breakaway panel to protect door panels from wind damage. Dampers shall be designed to slow panel movement after breakout.

C. Locking: Provide manufacturer’s approved multi-point locking system as follows:

1. Five-Point Locking: Provide locking components within sliding panels, operated by exterior cylinders and interior thumb turns, that extend flush bolts into overhead carrier assemblies and threshold on engagement of hook bolt lock and related cylinder. Provide BEST removable cylinder and key. See Section 087002 Door Hardware for core specifications.

D. Control Switch: Provide manufacturer’s standard keyed rotary switch mounted on the interior jamb and door position switch to allow for full control of the automatic entrance door. Key to be compatible with BEST removeable core. Controls to include, but are not limited to:

1. One-way traffic
2. Reduced Opening
3. Open/Closed/Automatic

E. Power Switch: Sliding automatic entrances shall be equipped with a two position On/Off rocker switch to control power to the door.

F. Weather Stripping: Manufacturer's standard replaceable components complying with AAMA 701; made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

1. Provide double pile weather stripping on lead stiles of sliding panels and stiles adjacent to jambs.
2. Provide single pile weather stripping between carrier and header, lead stiles of sidelights, and on pivot stiles of sliding panels.

G. Weather Sweeps: Adjustable, dual brush, nylon brush sweep mounted to underside of door bottom.

2.9 FABRICATION

A. General: Factory fabricates automatic entrance door assembly components to designs, sizes, and thickness indicated and to comply with indicated standards.

1. Form aluminum shapes before finishing.
2. Use concealed fasteners to greatest extent possible.

a. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
b. Reinforce members as required to receive fastener threads.

B. Framing: Provide automatic entrances as prefabricated assemblies.

1. Fabricate tubular and channel frame assemblies with manufacturer's standard mechanical or welded joints. Provide sub-frames and reinforcement as required for a complete system to support required loads.
2. Perform fabrication operations in manner that prevents damage to exposed finish surfaces.
3. Form profiles that are sharp, straight, and free of defects or deformations.
4. Prepare components to receive concealed fasteners and anchor and connection devices.
5. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.

C. Doors: Factory fabricated and assembled in profiles indicated. Reinforce as required to support imposed loads and for installing hardware.

D. Door Operators: Factory fabricated and installed in headers, including adjusting and testing.

E. Welding: Comply with AWS A5.10 - Specification for Bare Aluminum and Aluminum-Alloy Welding Electrodes and Rods.

F. Glazing: Fabricate framing with minimum glazing edge clearances for thickness and type of glazing indicated.

G. Hardware: Factory install hardware to the greatest extent possible; remove only as required for final finishing operation and for delivery to and installation at Project site.

2.10 FINISHES

A. Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.

B. Finish designations prefixed by "AA" conform to the system established by the Aluminum Association for designating aluminum finishes.

C. Finish aluminum automatic entrance door system components to match adjacent aluminum curtain wall or storefront work.

D. Class I Clear Anodized Finish: AA-M12C22A41 (Mechanical Finish: as fabricated, nonspecular; Chemical Finish: etched, medium matte; Anodic Coating: Class I Architectural, clear film thicker than 0.7 mil) complying with AAMA 607.1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify the openings are plumb and are dimensioned properly. Insure adequate support has been provided at the operator header. Proceed with the installation only after conditions are deemed satisfactory.

3.2 INSTALLATION

A. Comply with manufacturer's specifications and recommendations.

B. Set units plumb, level, and true to line without warp or rack of frames or doors. Anchor securely in place. Separate aluminum and other corrodible metal surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

1. Set headers, carrier assemblies, tracks, operating brackets, and guides level and true to location with anchorage for permanent support.

C. Door Operators: Connect door operators to electrical power distribution system. Coordinate with Electrical Facilities Subgroup.

D. Set sill members in a bed of sealant or with joint fillers or gaskets as indicated. Comply with requirements of Division 07 Section, Joint Protection for sealants, fillers, and gaskets, to be installed during installation of doors and frames.

1. Refer to Division 07 Section, Joint Protection for compounds, joint fillers, and gaskets to be installed after installation of frame assemblies.

E. Set tracks, header assemblies, operating brackets, rails and guides level and true to location with adequate anchorage for permanent support.

3.3 FIELD QUALITY CONTROL

A. Testing Services: Factory Trained Installer shall test and inspect each automatic entrance door to determine compliance of installed systems with applicable ANSI standards.

3.4 ADJUSTING AND CLEANING

A. After repeated operation of completed installation, equivalent to 3 days use by normal traffic (300 to 500 cycles), readjust door operators and controls for optimum operating condition and safety and for a tight closure. Lubricate hardware, operating equipment, and other moving parts.

B. Clean glass and aluminum surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Exercise care to avoid damage to coatings.

3.5 PROTECTION

A. Protect automatic entrance doors throughout the remainder of the construction period until the Date of Substantial Completion.

END OF SECTION 08 42 29

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SECTION 08 44 13 - GLAZED ALUMINUM CURTAIN WALL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Conditions/Provisions of Contract, including Contractual Conditions and other Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes glazed aluminum curtain wall systems.
B. Manufacturer shall pre-engineer the curtain wall to meet wind loads stated on structural drawings and high impact missile requirements.

1.3 SYSTEM DESCRIPTION AND PERFORMANCE REQUIREMENTS

A. General: Provide glazed aluminum curtain wall system that has the following capabilities based on testing manufacturer’s standard units in assemblies similar to those indicated for this Project:

1. Withstands loads and thermal and structural movement requirements indicated without failure. Failure includes the following:

   a. Air infiltration and water penetration exceeding specified limits.
   b. Framing members transferring stresses, including those caused by thermal and structural movement, to glazing units.

B. Glazing is physically and thermally isolated from framing members.

C. System is pressure equalized at its interior face.

D. System is reglazable from the exterior.

E. Curtain wall system shall be designed to meet wind-loading and pressures listed on Structural Drawings.

1. Deflection of framing members in a direction normal to wall plane is limited to 1/175 of clear span or 3/4 inches; whichever is smaller, unless otherwise indicated.

2. Test Performance: Provide glazed aluminum curtain wall system that does not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of clear span when tested according to ASTM E 330.

   a. Test Pressure: 150 percent of inward and outward wind-load design pressures.

   b. Duration: As required by design wind velocity; fastest mile of wind for relevant importance factor for the Project. According to TAS 202 in 30 seconds.

F. Dead Loads: Provide glazed aluminum curtain wall system members that do not deflect an amount which will reduce glazing bite below 75 percent of design dimension when carrying full dead load. Provide a minimum 1/8-inch clearance between members, and top of fixed panels, glazing, or other fixed part immediately below.

G. Live Loads: Provide glazed aluminum curtain wall system, including anchorage, that accommodates supporting structure's deflection from uniformly distributed and concentrated live loads indicated without failure of materials or permanent deformation.

H. Air Infiltration: Provide glazed aluminum curtain wall system with permanent resistance to air leakage through system of not more than 0.06 cfm/sq. ft. of fixed wall area when tested according to ASTM E 283 at a static-air-pressure difference of 6.24 lbf/sq.ft.

I. Water Penetration: Water Penetration under Static Pressure: No evidence of water penetration through fixed glazing and framing areas when tested according to ASTM E 331 and TAS 202 at 15psf (720 Pa).

J. Water Penetration under Dynamic Pressure: No evidence of water penetration through fixed glazing and framing areas when tested according to AAMA 501.1 at dynamic pressure equal to 15psf (720 Pa).

1) Maximum Water Leakage: According to AAMA 501.1 No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation]. Water leakage does not include water controlled by flashing and gutters that is drained to exterior.

K. Thermal Movements: Allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures:

1) Temperature Change (Range): 0 deg F (-18 deg C), ambient; 180 deg F (82 deg C), ambient hot. Minimum 3 cycles.

2) Test Interior Ambient-Air Temperature: [75 deg F (24 deg C)]

3) Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.

L. Windborne-Debris-Impact-Resistance Performance: Shall be tested in accordance with ASTM E 1886 and information in ASTM E 1996 and TAS 201/203.

1) Large –Missile Impact: For aluminum-framed systems located within 30 feet (9.1m) of grade.

M. Structural Support Movements: Provide glazed aluminum curtain wall system that accommodates structural movements including, but not limited to, sway, twist, column shortening, long-term creep, and deflection.

N. Condensation Resistance: When tested to AAMA Specification 1503, the condensation resistance factor shall not be less than:

1) 1630 SS IR:

a) CRF_{glass} (1-5/16" 1G HP) = 70, CRF_{frame} =74

O. Condensation Index (I): when tested to CSA-A440-00, the Condensation Index shall not be less than:

1) 1630 SS IR aluminum pressure plate:

a) I_{glass} (1-5/16" 1G HP) = 63, I_{frame} =67

P. Sound Transmission: Provide glazed aluminum curtain walls with fixed glazing and framing areas having the following sound-transmission characteristics:

1) 1630 SS IR:

a) (STC = 37) or (OITC = 32) when tested for laboratory sound transmission loss according to AAMA 1801, ASTM E 90 and ASTM E 1425, and based on 1-5/16" laminated insulating glass (1/4", 1/2" AS, 1/4").

Q. Dimensional Tolerances: Provide glazed aluminum curtain wall system, including anchorage that accommodates dimensional tolerances of building frame and other adjacent construction.

1.4 SUBMITTALS:

A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.

B. Product Data for each product specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.

C. Shop Drawings: 6 Copies signed and sealed for review and 6 copies Signed and sealed for County Growth Management Department.

1. Shop Drawings to be signed and sealed by a registered structural engineer licensed in the state of Florida.

2. Provide Design Calculations for wind load shall be stamped, sealed and signed by a Professional Engineer in the State of Florida verifying compliance with ASCE 7-10 and load pressures indicated on Drawings.

D. Samples for verification of each type of exposed finish required in manufacturer's standard sizes. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.

E. Cutaway Samples of each vertical-to-horizontal intersection of system, made from 12-inch lengths of full-size components and showing details of the following:

1. Joinery

2. Anchorage Details

3. Expansion provisions

4. Fastener size and type

5. Glazing

6. Flashing and drainage

F. Welder certificates indicating that welders comply with requirements specified in "Quality Assurance" Article.

G. Installer certificates signed by manufacturer certifying that installers comply with requirements in "Quality Assurance" Article.

H. Preconstruction test reports from a qualified independent testing agency indicating and interpreting test results relative to compliance with performance requirements of glazed aluminum curtain wall system.

I. Product test reports from a qualified independent testing agency evidencing compliance of glazed aluminum curtain wall system with requirements based on comprehensive testing of manufacturer's current system.

J. Field test reports from a qualified independent inspecting and testing agency indicating and interpreting test results relative to compliance with performance requirements of glazed aluminum curtain wall system.

K. Provide Manufacturer installation instructions.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: To qualify for approval, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 699, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.

B. Professional Engineering Qualifications: A professional engineer who is legally qualified to practice in the state of Florida and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of glazed aluminum curtain wall systems that are similar to those indicated for this Project in material, design, and extent.

C. Installer Qualifications: Engage an experience installer to assume engineering responsibility and perform work of this Section who has specialized in installing glazed aluminum curtain wall systems similar to those required for this Project and who is acceptable to manufacturer.

1. Engineering Responsibility: Engage a qualified professional engineer to prepare or supervise the preparation of date for glazed aluminum curtain wall systems, including drawings, testing program development, test-result interpretation, and comprehensive engineering analysis that shows systems' compliance with specified requirements.

2. Engineering Responsibility: Prepare date for glazed aluminum curtain wall systems, including drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

D. Source Limitations: Obtain each type of glazed aluminum curtain wall system from one source and by a single manufacturer.

E. Product Options: Drawings indicated size, profiles, and dimensional requirements of glazed aluminum curtain wall system and are based on the specific system indicated. Other manufacturer's systems with equal performance characteristics may be considered. Refer to Division 1 Section "Substitutions".

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

F. Welding Standards: Comply with applicable provisions of AWS D1.2, "Structural Welding Code – Aluminum."

1. Engage welders who have satisfactorily passed AWS qualification tests for welding processes involved and who are currently certified for these processes.

G. Mockups: Prior to installing glazed aluminum curtain wall system, construct mockups for each form of construction and finish required to verify selections made under Sample submittals and to demonstrate aesthetic effects as well as qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for Work.

1. Locate mockups on-site in the location and of the size indicated or, if not indicated, as directed by Architect.
2. Notify RPR/ Architect seven (7) days in advance of the dates and times when mockups will be constructed.
3. Demonstrate the proposed range of aesthetic effects and workmanship.
4. Obtain RPR/ Architect's approval of mockups before start of Work.
5. Retain and maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   a. When directed, demolish and remove mockups from Project site.
   b. Approved mockups in an undisturbed condition at the time of Substantial Completion may become part of the completed Work.

H. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 1 Section "Project Meetings". Review methods and procedures related to glazed aluminum curtain wall system including, but not limited to, the following:

1. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
2. Review structural loading limitations.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review required inspecting, testing and certifying procedures.

5. Review weather and forecasted weather conditions and procedures for coping with unfavorable conditions.

1.6 PROJECT CONDITIONS

A. Field Measurements: Verify dimensions by field measurements before fabrication and show recorded measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with fabrication without field measurements. Coordinate construction to ensure that actual dimensions correspond to guaranteed conditions.

1.7 WARRANTY

A. General Warranty: The special warranty specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by the Contractor under requirements of the Contract Documents.

B. Special Warranty: Submit a written warranty executed by the manufacturer agreeing to repair or replace components of a glazed aluminum curtain wall system that fail in materials or workmanship within the specified warranty period. Failures include, but are not limited to, the following:

1. Structural failures including, but not limited to, excessive deflection.
2. Noise or vibration caused by thermal movements.
3. Failure of system to meet performance requirements.
4. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
5. Failure of operating components to function normally.
6. Water leakage
7. Glazing breakage
8. Warrant Period: Manufacturer's Five (5) years from date of Substantial Completion and installer's two (2) years from date of Substantial Completion.

C. Special Finish Warranty: Provide manufacturer’s twenty (20) year warranty for finished coating system specified.

PART 2 - PRODUCTS

2.1 MANUFACTURER’S

A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include the following:

1. Basis of Design is YKK, AP America Inc.

2. Kawneer Company Inc.
3. Or Approved Substitution.

2.2 PRODUCT

A. YKK, YHC 300 OG-WZ3: 8 13/16" with 1-5/16" laminated insulated glass. FL12433

B. Kawneer, 1630 SS 1R: 8 13/16" with 1-5/16" laminated insulated glass. FL 16548

2.3 MATERIALS

A. Aluminum Extrusions: Alloy and temper recommended by glazed aluminum curtain wall manufacturer for strength, corrosion resistance, and application of required finish and not less than 0.070" wall thickness at any location for the main frame and complying with ASTM B 221: 6063-T6 alloy and temper.

B. Aluminum sheet alloy: Shall meet the requirements of ASTM B209.

C. Fasteners: Aluminum, nonmagnetic stainless steel or other materials to be non-corrosive and compatible with aluminum window members, trim hardware, anchors, and other components.

D. Anchors, Clips, and Accessories: Aluminum, nonmagnetic stainless steel, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

E. Pressure Plate: Pressure plate shall be aluminum and fastened to the mullion with stainless steel screws.

F. Reinforcing Members: Aluminum, nonmagnetic stainless steel, or nickel/chrome-plated steel complying with ASTM B 456 for Type SC 3 severe service conditions, or zinc-coated steel or iron complying with ASTM B 633 for SC 3 severe service conditions or other suitable zinc coating; provide sufficient strength to withstand design pressure indicated.

G. Sealant: For sealants required within fabricated curtain wall system, provide permanently elastic, non-shrinking, and non-migrating type recommended by sealant manufacturer for joint size and movement.

H. Thermal Barrier: Thermal barrier consists of 9/16" (14.25 mm) separation between the interior and exterior metal members in a typical condition, while maintaining a continuous watertight seal.

I. Tolerances: Reference to tolerances for wall thickness and other cross-sectional dimensions of glazed curtain wall members are nominal and in compliance with AA Aluminum Standards and Data.

J. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements, expect containing no asbestos, formulated for 30-mil thickness per coat.

2.4 CURTAIN WALL FRAMING

A. Framing Members: Manufacturer's standard extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
   1. Glazing System: 4 sided captured.
   2. Glazing Plane: Front.

B. Glass: 1-5/16” insulating glass for vision.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with non-staining, nonferrous shims for aligning system components.

D. Framing Sealants: Shall be suitable for glazed aluminum curtain wall as specified and tested by manufacturer.

E. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials. Where exposed shall be stainless steel.

F. Perimeter Anchors: When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

G. Packing, Shipping, Handling and Unloading: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

H. Storage and Protection: Store materials protected from exposure to harmful weather conditions. Handle curtain wall material and components to avoid damage. Protect curtain wall material against damage from elements, construction activities, and other hazards before, during and after installation.

2.5 COMPONENTS

A. Exterior Trim: Aluminum, profiles as indicated.

B. Brackets and Reinforcements: Provide manufacturer’s standard high-strength aluminum brackets and reinforcements. Provide non-staining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer’s standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible within adjacent materials. Finish exposed portions to match glazed aluminum curtain wall.
   1. At movement joints, use slip-joint linings, spacers, and sleeves of material and type recommended by manufacturer.
   2. Where fasteners anchor into aluminum less than 0.125-inch thick, provide reinforcement to receive fastener threads.
   3. Use exposed fasteners with countersunk Phillips screw heads finished to match framing members, unless otherwise indicated.

D. Anchors: 3-way adjustable anchors that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123 or ASTM A 153 requirements.

E. Concealed Flashing Dead-soft, 0.018-inch-thick stainless steel, complying with ASTM A 666, of type selected by manufacturer for compatibility with system.

2.6 FABRICATION

A. General: Fabricate glazed aluminum curtain wall system according to Shop Drawings. Fabricate components that, when assembled, will have accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortions. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

1. There shall be no split mullion seams.
2. Fabricate components to allow for expansion and contraction, field adjustment, and minimum clearance and shimming at the perimeter.
3. Prepare components to drain water passing joints, condensation occurring in glazing channels, condensation occurring within framing members, and moisture migrating within the system to the exterior.

B. Forming: Form shapes with sharp profiles, straight and free of defects or deformations, before finishing.

C. Welding: Weld components to comply with referenced standard and Shop Drawings, unless otherwise indicated. Weld before finishing components. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

D. Glazing Pockets: Provide minimum clearances for thickness and type of glass indicated according to FGMA's "Glazing Manual".

E. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

F. Frame Units: Factory assembly frame units according to Shop Drawings to greatest extent possible. Rigidly secure non-movement joints. Seal joints water-tight, unless otherwise indicated. Assemble components to drain water passing joints, condensation occurring in glazing channels, condensation occurring within framing members, and moisture migrating within the system to the exterior.

1. Install glazing according to Shop Drawings. Comply with requirements of Division 8 Section "Glazing", unless otherwise indicated.

2.7 ALUMINUM FINISHES

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying and designating finishes.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

C. Aluminum clear anodized conforming to AA-M10C22A41. Architectural Class I etched, medium matte, clear anodic coating 0.7mil minimum thickness.

2.8 STEEL PRIMING

A. General: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations relative to applying primer.

B. Surface Preparation: Perform manufacturer's standard cleaning operations to remove dirt, oil, grease, or other contaminants that could impair bond. Remove mill scale and rust, if present, from uncoated steel.

C. Priming: Apply manufacturer's standard corrosion-resistant primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of glazed aluminum curtain wall system. Do not proceed with installation until unsatisfactory conditions have been corrected
.

3.2 INSTALLATION

A. General: Comply with manufacturer's written instructions for protecting, handling, and installing glazed aluminum curtain wall system. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints. Seal joints water-tight, unless otherwise indicated. Provide means to drain water to the exterior to produce a permanently weatherproof system.

B. Metal Protection: Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Install components to drain water passing joints, condensation occurring in glazing channels, condensation occurring within framing members, and moisture migrating within the system to the exterior.

D. Install framing members plumb and true in alignment with established lines and grades.

E. Install factory-assembled frame units plumb and true in alignment with established lines and grades.

F. Anchorage: After system components are positioned, fix connections to building structure as indicated on Shop Drawings.

1. Provide separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.

G. Welding: Weld components to comply with references standard and Shop Drawings, unless otherwise indicated. Weld in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.

H. Install glazing according to Shop Drawings. Comply with requirements of Division 8 Section “Glazing”, unless otherwise indicated.

I. Install sealant according to Shop Drawings. Comply with requirements of Division 7 Section “Joint Sealants”, unless otherwise indicated.

J. Install insulation materials in locations indicated. Comply with requirements of Division 7 Section “Building Insulation”, unless otherwise indicated.

K. Refer to Division 7 “Firestopping” for firestopping of perimeter joints.

L. Erection Tolerances: Install glazed aluminum curtain wall system to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet
2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet
3. Alignment: Where surfaces abut in line, limit offset from true alignment to 1/16 inch; where a reveal or protruding element separates aligned surfaces by less that 2 inches, limit offset to 1/2 inch.
4. Location: Limit variation from plane or location shown on Shop Drawings to 1/8 inch in 12 feet; 1/2 inch over total length.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified independent testing agency to perform testing indicated.

B. Air Infiltration: Test areas of installed system indicated on Drawings for compliance with system performance requirements according to ASTM E 783.

C. Water Penetration: After the installation of the minimum number of test specimens indicated has been completed but before installation of interior finishes has begun, test systems for compliance with performance requirements according to ASTM 1105, expanded to include the joint between the glazed aluminum curtain wall and adjacent

construction, at minimum differential pressure of 20 percent of inward acting wind-load design pressure as defined by ASCE 7, "Minimum Design Loads for Buildings and Other Structures", but not less than 10 lbf/sq. ft.

1. The minimum dimensions of the required test areas shall be a full height, by 3 window panel wide sections of Curtain Wall.
2. The Architect will select the Curtain Wall areas to be tested.

D. Repair and remove Work that does not meet requirements or that is damaged by testing; replace to conform to specified requirements.

1. Should any of the specimens fail the field test, the specimens may be modified or repaired, re-tested.
2. Should any of the specimens fail the second field test, the specimens may be additionally modified or repaired, and re-tested.
3. All modifications and repairs made to the specimens shall be recorded, and the same modifications and repairs made to all the aluminum systems and adjacent construction on the Project.
4. Should the second test fail, the Architect with concurrence of the OAR may require two additional windows or bays and their adjacent construction to be tested.
5. Additional testing and inspecting at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

E. Rejection: Failure of any of the specimens to meet the test requirements of the third test shall be cause for rejection of all aluminum systems and adjacent construction on the Project.

3.4 PROTECTION

A. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and installer, that ensure aluminum curtain wall system is without damage or deterioration at the time of Substantial Completion.

END OF SECTION 08 44 13

SECTION 08 71 00 - DOOR HARDWARE AND SCHEDULE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Related Sections:

1. 08 10 00, “Steel Doors and Frames”
2. 08 31 13, “Access Doors and Frames”
3. 08 42 29, “Automatic Entrances”
4. DIVISIONS 26, 27 & 28.

1.2 SCOPE

A. Work covered by this Section of Specifications consists of furnishing and delivering to the job site for fitting and installation of all finish hardware complete, in accordance with this Section and applicable drawings, and subject to terms and conditions of Contract.

B. It is intended that the following list of hardware will cover all finish hardware to complete the project. Omissions and/or discrepancies shall be brought to the Architect's attention during the bidding period. If a hardware set for a door is not called out in the specifications, but the door is shown on the drawings, provide hardware set of similar to door set listed here in. Provide complete hardware set for all doors shown on plan.

C. To the extent specified and shown on the drawings, provide and install all hardware for doors per schedule and/or notes on the drawings. Provide and install all hardware for doors shown on drawing plans.

D. Field coordination with field conditions is required.

E. Coordination with systems, electrical and wayfinding work is required.

F. This Section references specification sections relating to commercial door hardware for the following:

1. Swinging Doors.
2. Other doors to the extent indicated in the specifications and contract documents. Provide hardware components required and as noted on the drawings.

G. Commercial door hardware includes, but is not necessarily limited to, the following:

1. Mechanical door hardware.
2. Passive door hardware.
3. Electro mechanical and access control door hardware.
4. Electro mechanical and access control door hardware power supplies, back-ups and surge protection.
5. UL listed transfer hinges.
6. Automatic operators.

7. Permanent Removable key Cylinders
8. Cylinders specified for doors in other sections. IE Aluminum Frame Folding Doors, Automatic Entrances and Access doors.

H. Codes and References: Comply with the version year adopted by the Authority Having Jurisdiction. (The basis of governing code is the edition in effect at the time on which contract documents were received by AHJ for permit review)

1. ANSI A117.1 – Accessible and Usable Buildings and Facilities.
2. FBC – Florida Building Code 2017and Amendments
3. FFPC- Florida Fire Protection Code 2017
4. NFPA 70 – National Electrical Code.
5. NFPA 80 – Fire Doors and Windows.
6. NFPA 101 – Life Safety Code. (As revised by Florida Fire Prevention Code 2017)
7. NFPA 105 – Installation of Smoke Door Assemblies.

I. Standards: Reference Related Sections for requirements regarding compliance with applicable industry standards.

J. Exterior doors will require document submittals for confirmation with NOA and/or Florida Product approval.

K. Provide and install permanent cores, coordinating with VPS locksmith.

1.3 SUPPLIER

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Designer, VPS designated Locksmith and RPR about door hardware and keying.

1. Warehousing Facilities: In Project's vicinity.
2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.

B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as follows:

1. For door hardware, an Architectural Hardware Consultant (AHC) who is also an Electrified Hardware Consultant (EHC) and Architectural Openings Consultant (AOC).

2. Include AHC, EHC and AOC certificates with submittal.

C. Source Limitations: Obtain each type of door hardware from a single manufacturer.

1. Provide electrified door hardware from same manufacturer as mechanical door hardware, unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

D. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C, unless otherwise indicated.

E. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.

F. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.

G. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and Florida Building Code Accessibility 2017.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).
2. Comply with the following maximum opening-force requirements:

   a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
   b. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.

3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.

H. Keying Conference: Conduct conference at Project site to comply with requirements in Section 01 31 13 "Project Coordination." In addition to Contractor, and Architect, conference participants shall also include Installer's Architectural Hardware Consultant and VPS designated locksmith. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:

1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
2. Preliminary key system schematic diagram.
3. Requirements for key control system.
4. Requirements for access control.

5. Address for delivery of keys.

I. Preinstallation Conference: Conduct conference at Project site.

1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Inspect and discuss preparatory work performed by other trades.
3. Inspect and discuss electrical roughing-in for electrified door hardware.
4. Review sequence of operation for each type of electrified door hardware.
5. Review required testing, inspecting, and certifying procedures.

1.4 DELIVERY

A. Items of finish hardware shall be delivered to the project site or as otherwise specified or required, and shall be checked in for completeness and familiarization with the contractor. All items of Finish Hardware shall be packaged, numbered, labeled to identify each opening for which it is intended and to correspond with item numbers on the approved Hardware Schedule.

1.5 TEMPLATES

A. All finish Hardware to be installed on or in metal doors and/or frames shall be manufactured to template. Template machine screws shall be furnished for all such materials. The supplier and Owner shall furnish Hardware Schedules as approved by the Architect and all necessary templates to metal door and frame fabricators for their coordination's use.

1.6 SUBMITTALS

A. Submit complete electronic copy of typewritten Hardware Schedules to the Architect for approval. After approval, provide required number of copies of approved Hardware Schedule for Distribution. No factory Order shall be placed for materials until approval has been given by the Architect.

B. Electronic current copy of a catalog cut shall be submitted with the Hardware Schedule for each item of hardware listed in the schedule. The item shall be highlighted with red box or cloud around item.

C. Submit complete typewritten Hardware Schedules to the Architect for review. After approval provide required number of copies of approved Hardware Schedule for distribution. No factory Order shall be placed for materials until review has been completed by the Architect .

1. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
2. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening. Organize door hardware sets in same order as in the Door Hardware Sets at the end of

Part 3. Submittals that do not follow the same format and order as the Door Hardware Sets will be rejected and subject to resubmission.

3. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
4. Content: Include the following information:
    a. Type, style, function, size, label, hand and finish of each door hardware item.
    b. Manufacturer of each item.
    c. Fastenings and other pertinent information.
    d. Location of door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
    e. Explanation of abbreviations, symbols, and codes contained in schedule.
    f. Door and frame sizes and materials.

D. Keying Schedule: Prepared under the supervision of the Owner, separate schedule detailing final keying instructions for lockets and cylinders in writing. Include keying system explanation, door numbers, key set symbols, hardware set numbers and special instructions. Owner to approve submitted keying schedule prior to the ordering of permanent cylinders. Coordinate with VPS designated Locksmith.

E. Summary or comments.

F. Product Test Reports: Indicating compliance with cycle testing requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified independent testing agency.

G. Operating and Maintenance Manuals: Provide manufacturer's operating and maintenance manuals for each item comprising the complete door hardware installation in quantity as required in Division 01, Closeout Submittals. The manual to include the name, address, and contact information of the manufacturers providing the hardware after completion of the installation test to include "as built" modifications made during installation, checkout and acceptance.

H. Warranties and Maintenance: Special warranties and maintenance agreements specified.

I. Certificates showing compliance certifications for AHC, EHC and AOC for preparer of submittal.

1.7 RESPONSIBILITY

A. It shall be the supplier's responsibility to furnish hardware in accordance with the intent of this specification, the functional use of door. Where, by virtue of Architectural design or by function,

a change is necessary, hardware of equal design and quality shall be furnished upon written approval of the Architect.

1.8 LOCATIONS

A. Hardware locations dimension shall be as follows: Distance from finish floor to center line of:

Door Knob	38"
Door Pull	42"
Deadlock	60"
Exit Bolt Cross Bar	38"
Push Plate	50"
Butt Hinges	Bottom Hinges: Finish floor to bottom of Hinge 10".

Top Hinge: Head rabbet to top of Hinge 5".

Center Hinge: Equal distance between top and bottom hinges.

180 DEGREES OPENINGS

B. Other than those doors that are restricted to less than 180 degrees opening by building or by overhead holders or stops, all butts and/or closer arms shall be of sufficient size to allow full 180 degrees opening of doors.

1.9 WARRANTY

A. Provide in writing, guarantee that materials furnished under this Section are free from defect and warrant workmanship for a period of one (1) year from date of final payment. Exception: Supply closers with a ten- (10) year warranty from date of final payment.

1.10 DELIVERY, STOAGE AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up and shelving for door hardware delivered to Project site. Do not store electronic access control hardware, software or accessories at Project site without prior authorization.

B. Tag each item or package separately with identification related to the contract documents and final Door Hardware Schedule. Include basic installation instructions with each item or package.

C. Deliver, as applicable, permanent keys, cylinders, cores, access control credentials, software and related accessories directly to Owner via registered mail or overnight package service. Instructions for delivery to the Owner shall be established at the “Keying Conference”.

1.11 COORDINATION

A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing standard and electrical hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing hardware to comply with indicated requirements.

B. Door and Frame Preparation: Division 08 Sections doors and corresponding frames are to be prepared, reinforced and pre-wired (if applicable) to receive the installation of the specified electrified, monitoring, signaling and access control system hardware without additional in-field modifications.

PART 2 - PRODUCTS

2.1 BUTTS

Doors 1-3/4" thick:	Minimum 4-1/2" high
Doors 1-3/8" thick:	Minimum 3-1/2" high

A. Each door shall not have less than three hinges. Doors 7'-10" and higher shall have four (4) hinges whether specified under items or not.

B. All butts used with door closers shall be ball bearing. All exterior doors shall have ball bearing butts.

C. Approved manufacturers are:

Hager	Five Knuckle, Ball Bearing, Heavy Duty, ANSI A 5111 Stainless Steel, BB1199, US32D, 630, Satin Stainless Steel

2.2 FINISH:

Butts, Exterior	US32D, 630, Satin Stainless Steel
Butts, Interior	US32D, 630, Satin Stainless Steel
Locks	US32D, 630, Satin Stainless Steel
Push, Pull, Kick Plates	US32D, 630, Satin Stainless Steel
Closers	US32D, 630, Satin Stainless Steel
Panic Devices	US32D, 630, Satin Stainless Steel
Door Stops, Miscellaneous	US32D, 630, Satin Stainless Steel
Door Trim	US32D, 630, Satin Stainless Steel

2.3 LOCKSETS

A. Manufacturer: BEST Mortise, 45H Series ANSI A156.13, Series 1000, Grade 1 operational, Grade 2 Security, Heavy Duty Mortise Locksets with Removable core with interchangeable cylinder. 630 Stainless Steel.

B. Manufacturer: Best Mortise, 48 H Series Deadlocks with removable core with interchangeable cylinder. 630 Stainless Steel.

C. Approved Substitution: NONE ALLOWED

2.4 CLOSERS

A. Closers shall be of the following manufacturers and shall be furnished in the manufacturer's recommended printed size for the specified conditions unless otherwise noted in the hardware sets. Closers shall be full rack and pinion complete with back check. Springs shall be motor clock type. Furnish flush mount transom brackets where not transom bar exists. Furnish parallel arm where required.

MANUFACTURER	SERIES
LCN	#4040 XP Extra Heavy Duty, Metal Cover 72 MC 630 Cush-N-Stop
	#4041XP-3049 Extra Heavy Duty, Metal Cover 72 MC 630, At Gate doors, 180 degree hold open.

2.5 DOOR TRIM

A. All push plates, pulls, pull plates, kick and/or armor plates shall be any one of the following manufacturer's products in catalog number as set forth herein:

MANUFACTURER	PUSH PLATE	PULL PLATE	KICK PLATE
Ives	8"x 16"	4" x 16"	8" High
Trimco	1001.11	1014.3	8" High
Rockwood	8" X 16"	4" X 16"	----------
Baldwin	8" X 16"	4" X 16"	----------

B. FINISH: 630 Satin Stainless Finish

2.6 DOOR STOPS

A. Stops shall be one of the following manufacturers:

MANUFACTURER	WALL	FLOOR
Ives	WS 404-CVX	----------
Glynn-Johnson	----------	----------
Hager	----------	----------

Finish: 630 (US32D) Satin Stainless Finish

2.7 THRESHOLDS

A. The following types of Manufacturer of Thresholds shall be used:

TYPE	MANUFACTURER
AS SCHEDULED	PEMKO

2.8 WEATHER/SOUND PERIMETER STRIPPINGS AND BOTTOM DROP SILLS

A. The following types of manufactures:

TYPE	MANUFACTURER
AS SCHEDULED OR REQUIRED BY FUNCTION	PEMKO

2.9 LOCK CYLINDERS, CORE AND KEYING

A. All locks, cores and keys on Airport Property shall be 'BEST' format, 7 pin small format interchangeable 'F' zero-bitted cores. No alternates will be accepted. Blank core & keys for each new lock are to be provided to the Airport's locksmith (vendor) to rekey prior to substantial completion. Grand Master keys, master keys and spare keys are not necessary.

B. Provide and install all hardware including locking hardware and provide removable temporary cores keyed for construction for use by the contractor, A/E and airport. Provide keys as required to cover needs of the construction project.

C. Provide Blank cores and keys for each new lock. Deliver to the Airport's Locksmith (vendor) to rekey prior to substantial completion. The Locksmith will perform all keying. Grand Master keys, master keys and spare keys are not necessary.

D. At Substantial occupancy the G.C. will install all re keyed cores as directed by VPS or VPS Locksmith (vendor).

E. Provide and install all "BEST" Removable Cylinders for all locksets and panic/fire devices. Coordinate with VPS Locksmith (vendor)

2.10 FASTENING

A. All screws shall be of matching finish to their product being fastened or installed and shall be the manufacturer's standard for that item.

B. Sex Bolts: Door closers, door holders, and exit devices installed on wood door shall be attached by means of thru-bolts and sex-nuts.

2.11 PANIC & FIRE DEVICES

A. VonDuprin Series 98/99 -630

B. VonDuprin Series 98/99 Chexit Electrified- 630

C. VonDuprin Series 98/99F-630

2.12 ACCESS CARD SYSTEM READER

A. Flush mounted, HID iClass RK40 with door number label.

2.13 SWITCH

A. "Sentrol" 2700 Series High Security Concealed Magnetic Contact.

2.14 AUDIO VISUAL ALARM

A. Interior flush mounted, Wheellock, MTWP-2475 W-NW, Multi-tone Strobe, Multi candela field selectable, white light with clear lense, white body.

B. Exterior flush mounted: Wheellock series, MTWP with amber lens, for wet location.

2.15 ELECTRIC STRIKE

A. HES 8500 Electric door strike, fail secure, provide optional face plate for "BEST o mortise locks

2.16 ELECTRIC POWER TRANSFER

A. Manufacturers: Subject to compliance with requirements provide products by one of the following:
   1. Von Duprin EPT.
   2. Securitron CEPT

B. Requirements:
   1. Provide power transfer with electrified options as scheduled in the hardware sets.
      a. Provide with number and gage of wires sufficient to accommodate electric function of specified hardware.
   2. Power transfer hinges are not allowed.

2.17 SIGNAGE ON DOORS:

A. Signage on doors to AOA: See wayfinding drawing for special delayed egress signage with international graphic symbols and other legal signage.

B. Signage at the top of every door frame with door number. See wayfinding drawings.

C. Signage at the lockset side of each door identifying room. See wayfinding drawings.

2.18 CONSTRUCTION AND PERMANENT CORES

A. Provide temporary and final permanent cores for each lock.

2.19 POWER SUPPLIES

A. Provide electrical accessories, such as power supply box for each electric hardware installation. See systems documents.

PART 3 - EXECUTION

3.1 DELIVERIES

A. Stockpile items sufficiently in advance to ensure their availability, and make necessary deliveries in a timely manner to ensure orderly progress of work.

3.2 INSPECTION AND INSTALLATION

A. Install finish hardware by hardware supplier.

B. Certify installers are factory trained for products specified in this Section.

C. Do not install surface-mounted items until finishes have been completed.

D. Set thresholds for exterior doors in full bed of caulking as specified in Section "Joint Sealers".

E. Upon completion of installation, and as a condition of its acceptance, visually inspect finish hardware furnished under this Section and place in optimum working condition. Turn over to VPS Locksmith, permanent cores, installation instructions, templates, adjusting tools and extra parts.

F. Check upon completion of Project, check locks with VPS locksmith for proper location, operation, and keying.

G. Final Adjustment:

1. Wherever hardware installation is made more than one (1) month prior to final payment or occupancy of a space or area, return to work during week prior to acceptance or occupancy and make final check and adjustment of hardware items in such space or area.

2. Clean operating items as necessary to restore proper function and finish of hardware and doors.

3. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

H. Instruct VPS's personnel in proper adjustment, maintenance of hardware and repair of hardware. Videotape this instruction meeting and provide one copy of DVD-format disk to VPS for future use.

PART 4 - SCHEDULE

HARDWARE SET NO.1,

Doors: W-1005, W-1007, W-1010, W1013 Each bypass sliding door to have:

2-BEST removable cores and cylinders (1 core for locking dead bolt, 1 core for control switch interior).

4-Door Position Switches (At each active break out panel).

Balance of hardware by door manufacturer. Dead bolts (DL), Storm rated (SR)

HARDWARE SET NO. 2,

NOT USED

HARDWARE SET NO. 3,

Doors: W-1003, W-1285, W1283, W1273, W1271 Each door to have:

1-Mortise Lockset-Privacy F-19 "BEST" 45H, STRIKE, LEVER 16, ROSE-S, 630, VIT-14 VISUAL INDICATOR.

1-Closer-LCN-4040 XP-72MC-62PA-630

1 ½ PAIR at Doors W1283 & W1271, HAGER-4 ½" x 4 ½" -BB-1199 FIVE KNUCKLE BALL BEARING, HEAVY WEIGHT-ANSI A-5111 (S.S.), US32.

2 PAIRS at Doors W-1003, W-1285, W1273 HAGAR-4 ½" X 4 ½ "-BB-1199 FIVE KNUCKLE BALL BEARING, HEAVY WEIGHT-ANSI A-5111 (S.S.), US32.

1-WALL STOP-IVES-WS 404, CVK-626

2-Kick Plates, IVES 8400 x 8"-S.S.-630

1-Set of Weather Strip- PEMKO- 0-285, CPKL

1-Bottom Door Closer-PEMKO-430, CPKL

1-Sill- PEMKO-271A

HARDWARE SET NO. 4,

Doors: W-1064 Each door to have:

1-Mortise Lockset-Privacy F-19 "BEST" 45H, STRIKE, LEVER 16, ROSE-S, 630, VIT-14 VISUAL INDICATOR.

1-Closer-LCN-4040 XP-72MC-62PA-630 CUSH MOUNT

2 PAIR, HAGAR-4 ½" X 4 ½ "-BB-1199 FIVE KNUCKLE BALL BEARING, HEAVY WEIGHT-ANSI A-5111 (S.S.), US32.

1-Floor Stop-IVES-WS 410-626

2-Kick Plates, IVES 8400 x 8"-S.S.-630

1-Set of Weather Stripping- PEMKO- 0-285, CPKL

1-Weather Strip@Closer-PEMKO-588BL

1-Bottom Door Closer-PEMKO-430, CPKL

1-Sill- PEMKO-271A

HARDWARE SET NO. 5,

Doors: W-1062, W-1276, W-1081 - Each door to have:

1-Mortise Lockset-Office, F-20 "BEST" 45H, STRIKE, LEVER 16, ROSE-S, 630.

1-Removable Key Core & Cylinder, "BEST" 7 Pin, Small Format Interchangeable "F" zero Bitted Core.
1-Removable Key Core & Cylinder, "BEST" 7 Pin, Small Format Interchangeable "F" zero Bitted Core, "BEST" cylinder.

1-Closer-LCN-4040 XP-72MC-62PA-630 CUSH MOUNT

1 ½ PAIR, at Door W-1276, HAGAR-4 ½" X 4 ½ "-BB-1199 FIVE KNUCKLE BALL BEARING, HEAVY WEIGHT-ANSI A-5111 (S.S.), US32, N.R.P.

2-PAIRS, at Doors W-1062, W-1081, HAGAR-4 ½" X 4 ½ "-BB-1199 FIVE KNUCKLE BALL BEARING, HEAVY WEIGHT-ANSI A-5111 (S.S.), US32, N.R.P.

1-WALL STOP-IVES-WS 404, CVK-626

2-Kick Plates, IVES 8400 x 8"-S.S.-630

1-Set of Weather Stripping- PEMKO- 0-285, CPKL

1-Weather Strip@Closer-PEMKO-588BL

1-Bottom Door Closer-PEMKO-430, CPKL

1-Sill- PEMKO-271A

HARDWARE SET NO. 6,

Doors: W-1006, W-1063, W-1018, W-1061, W-1282, W-1279, W-1270, W-1268 - Each door to have:

1-Mortise Lockset at Doors W-1063, W-1018, W-1282, W-1279, W-1270, W-1268 Storage Room, F-07 "BEST" 45H, STRIKE, LEVER 16, ROSE-S, 630.

1-Mortise Lockset at Doors W-1061, Intruder, F-33 "BEST" 45H, STRIKE, LEVER 16, ROSE-S, 630.

1-Removable Key Core & Cylinder, "BEST" 7 Pin, Small Format Interchangeable "F" zero Bitted Core, "BEST" cylinder.

1-Closer-LCN-4040 XP-72MC-62PA-630 CUSH MOUNT

2-PAIRS, HAGAR-4 ½" X 4 ½ "-BB-1199 FIVE KNUCKLE BALL BEARING, HEAVY WEIGHT-ANSI A-5111 (S.S.), US32, N.R.P.

1-WALL STOP-IVES-WS 404, CVK-626

2-Kick Plates, IVES 8400 x 8"-S.S.-630

1-Set of Weather Stripping- PEMKO- 0-285, CPKL

1-Weather Strip@Closer-PEMKO-588BL

1-Bottom Door Closer-PEMKO-430, CPKL

1-Sill- PEMKO-271A

HARDWARE SET NO. 7, Doors: W-1001-Each door to have:

1-Exit Device, Von Duprin- E9875L-HH-F-630

1-Closer-LCN-4040 XP-72MC-62PA-630 CUSH MOUNT

1-Removable Key Core & Cylinder, "BEST" 7 Pin, Small Format, Interchangeable "F" zero Bitted Core.

1 ½ PAIR BUTTS - 4 ½" x 4 ½" -BB-1199 FIVE KNUCKLE BALL BEARING, HEAVY DUTY WEIGHT-ANSI A-5111 (S.S.), US32, N.R.P.

2-Kick Plates, IVES 8400 x 8"-S.S.-630

1-Overhead DRIP-PEMKO C346

1-Set of Weather Stripping- PEMKO- 0-285, CPKL

1-Weather Striping@Closer-PEMKO-588BL

1-Bottom Door Closer-PEMKO-430, CPKL

1-Sill- PEMKO-271A

1-Exterior Offset Security Bar-PEMKO 3572-PP7

HARDWARE SET NO. 8, Doors: W-1004, W-1278, W-1277, W-1267, W-1266-Each door to have:

1-Mortise Lockset Storage Room, F-07 "BEST" 45H, STRIKE, LEVER 16, ROSE-S, 630.

1-Closer-LCN-4040 XP-72MC-62PA-630 CUSH MOUNT

1-Removable Key Core & Cylinder, "BEST" 7 Pin, Small Format, Interchangeable "F" zero Bitted Core.

1 ½ PAIR, BUTTS - 4 ½" X 4 ½ "-BB-1199 FIVE KNUCKLE BALL BEARING, HEAVY DUTY WEIGHT-ANSI A-5111 (S.S.), US32, N.R.P.

2-Kick Plates, IVES 8400 x 8"-S.S.-630

1-Overhead DRIP-PEMKO C346

1-Set of Weather Stripping- PEMKO- 0-285, CPKL

1-Weather Striping@Closer-PEMKO-588BL

1-Bottom Door Closer-PEMKO-430, CPKL

1-Sill- PEMKO-271A

1-Exterior Offset Security Bar-PEMKO 3572-PP7

.

HARDWARE SET NO. 9, Doors: W-1051, W-1121, W-1151, W-1201, W-1232 - Each door to have:

1-Mortise Exit Device, Von Duprin- E9875EO-HH-QEL-ALK-SS-CON-630, RSS.

1-Removable Key Core & Cylinder, "BEST" 7 Pin, Small Format Interchangeable "F" zero Bitted Core, "BEST" cylinder, For Alarm Reset.

1-Closer-LCN-4040 XP-72MC-62PA-630 CUSH MOUNT

1 ½ PAIR, HAGAR-4 ½" X 4 ½ "-BB-1199 FIVE KNUCKLE BALL BEARING, HEAVY DUTY WEIGHT-ANSI A-5111 (S.S.), US32, N.R.P.

2-Kick Plates, IVES 8400 x 8"-S.S.-630

1-Exterior Offset SECURITY BAR-PEMKO 3572-PP7

1-Overhead DRIP-PEMKO C346

1-SWITCH Control- 2700 Series HIGH SECURITY CONCEALED MAGNETIC SWITCH.

1-Set of Weather Stripping- PEMKO- 0-285, CPKL

1-Set of Weather Stripping@Closer-PEMKO-588BL

1-Bottom Door Closer-PEMKO-430, CPKL

1-Sill- PEMKO-2715A HEAVY DUTY

1-Electric Power Transfer-Von-Duprin EPT

1-DIB

HARDWARE SET NO. 10, Doors: W-1072, W-1114, W-1141, W-1183, W-1231 - Each door to have:

1-Mortise DELAYED Exit Device, Von Duprin-CX-HH-9875L-BE-F-E-7500-03-SS-FSE-630-CON.

1-Removable Key Core & Cylinder, "BEST" 7 Pin, Small Format Interchangeable "F" zero Bitted Core, "BEST" cylinder.

1-Closer-LCN-4041 XP-3049-MC-72 EXTRA HEAVY DUTY, 180 DEGREE, HOLD OPEN, 630.

1-HINGE CONTINUOUS: HAGER ROTON, 780-046HD, HEAVY DUTY, HALF SURFACE CONTINOUS HINGE, ALUMINUM 6063-T6, Custom Cut, Modified to accept EPT

1-FLOOR STOP- IVES-FS-410-626

2-Kick Plates, IVES 8400 x 8"-S.S.-630

1-Set of Weather Stripping- PEMKO- 0-285, CPKL

1-Weather Strip@Closer-PEMKO-588BL

1-Bottom Door Closer-PEMKO-430, CPKL

1-Sill- PEMKO-2715A HEAVY DUTY

1-Overhead DRIP-PEMKO C346

2-Proximity Card Reader and Push Pad:
HID iClass RK40/Provide Lable

1-SWITCH Control- 2700 Series HIGH SECURITY CONCEALED MAGNETIC CONTACT

1-Electric Power Transfer-Von Duprin EPT

2-STROBES - "WHEELOCK"-Interior & Exterior MTWP-2475 W-NIV, Multi-Tone Strobe, Multi-Candela Selectable, with Amber Lense, White Body at exterior location. Use model for WET location.

1-DIB

1-DOOR DECAL- See Drawings

HARDWARE SET NO. 11, Doors: W-1251A-Each door to have:

1-Mortise, Classroom, F-06 "BEST" 45H, STRIKE, LEVER 16, ROSE-S, 630.

1-Closer-LCN-4040 XP-72MC-62PA-630 CUSH MOUNT

1-Removable Key Core & Cylinder, "BEST" 7 Pin, Small Format, Interchangeable "F" zero Bitted Core.

2 PAIRS, BUTTS - 4 ½" X 4 ½ "-BB-1199 FIVE KNUCKLE BALL BEARING, HEAVY DUTY WEIGHT-ANSI A-5111 (S.S.), US32, N.R.P.

2-Kick Plates, IVES 8400 x 8"-S.S.-630

1-Overhead DRIP-PEMKO C346

1-Set of Weather Stripping- PEMKO- 0-285, CPKL

1-Weather Striping@Closer-PEMKO-588BL

1-Bottom Door Closer-PEMKO-430, CPKL

1-Sill- PEMKO-2715A Heavy Duty

1-DIB

1-Floor Stop- IVES-FS 410-626

HARDWARE SET NO. 12, Doors: W-2331B-Each pair of doors to have:

1-DELAYED Egress Device, Von Duprin-CX-HH-9857L-BE-F-E-7500-03-SS-FSE-630-CON, RSS-RG-27

7-Removable Key Core & Cylinder, "BEST" 7 Pin, Small Format Interchangeable "F" zero Bitted Core, "BEST" cylinder.

1-Removable Key MULLION-Von Duprin, Key removable MULLION, Steel-SPECIAL Order.

2-Closers-LCN-4041 XP-3049-MC-72 EXTRA HEAVY DUTY, 180 DEGREE, HOLD OPEN.

4-HINGE CONTINUOUS: HAGER ROTON, 780-046HD, HEAVY DUTY, HALF SURFACE CONTINOUS HINGE, ALUMINUM 6063-T6, Custom-Cut, Modified to accept EPT.

2-FLOOR STOP- IVES-FS-410-626

4-Kick Plates, IVES 8400 x 8"-S.S.-630

2-Set of Weather Stripping- PEMKO- 0-285, CPKL

2-Sets of Weather Stripping@Closer-PEMKO-588BL

2-Bottom Door Closer-PEMKO-430, CPKL

2-Sill- PEMKO-2715A HEAVY DUTY

1-Overhead DRIP-PEMKO C346

2-Proximity Card Reader and Push Pad (On active Door) HID iClass RK40/Provide Lable, (Secured and UnSecured Side)

2-SWITCHES-(for Each Leaf) Sentrol- 2700 Series HIGH SECURITY CONCEALED MAGNETIC CONTACT

2-Electric Power Transfer-Von Duprin EPT

2-STROBES - “WHEELOCK”-Interior & Exterior MTWP-2475 W-NIV, Multi-Tone Strobe, Multi-Candela Selectable, with Amber Lense, White Body at exterior location. Use model for WET location.

1-DIB

HARDWARE SET NO. 13, ALL ACCESS Doors: Each door to have:

QUANTITY AS REQUIRED- Removable Key Core & Cylinder, “BEST” 7 Pin, Small Format Interchangeable “F” zero Bitted Core, “BEST” Cylinders.

END OF SECTION 08 71 00

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SECTION 08 80 00 - GLAZING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide glazing work specified and shown on drawings.

B. Requirements for glazing work include the following:

1. Aluminum Frame Folding Doors.

2. Automatic Entrances.

2. Curtain walls.

3. Mirrors.

4. Other interior glass lights.

1.2 RELATED WORK

A. Section 08 42 29, “Automatic Entrances”

B. Section 08 44 13, “Glazed Aluminum Curtain Wall”

C. Section 10 22 00, “Demountable Wall System”

1.3 REFERENCE STANDARDS

A. The latest edition of publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

1.	ASTM C 542	Lock Strip Gasket
2.	ASTM C 864	Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
3.	ANSI Z97.1	Safety Glazing Materials Used in Buildings

ASTM INTERNATIONAL (ASTM)

1. ASTM C 1036 Flat Glass

2. ASTM C 1048 Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass

3. ASTM C 1172 Laminated Architectural Flat Glass

4. ASTM D 1667 Flexible Cellular Materials-Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam)

5. ASTM E 774 Classification of the Durability of Sealed Insulating Glass Units

6. ASTM E 1300 Practice for Determining Load Resistance of Glass in Buildings

CONSUMER PRODUCT SAFETY COMMISSION (CPSC)

1. CPSC 16 CFR 1201 Safety Standard for Architectural Glazing Materials

FEDERAL SPECIFICATIONS (FS)

1. FS A-A-3002 Glass Mirrors

FLORIDA BUILDING CODE: 2017 EDITION

1. Glazing System Wind Loading Requirements

FLORIDA PRODUCT APPROVALS

GLASS ASSOCIATION OF NORTH AMERICA (GANA)

1. GANA Glazing Manual

2. GANA Sealant Manual

3. Laminated Glass Design Guide

INSULATING GLASS CERTIFICATION COUNCIL (IGCC)

SAFETY GLASS CERTIFICATION COUNCIL (SGCC)

SEALED INSULATING GLASS MANUFACTURERS ASSOCIATION (SIGMA)

1. TM 3000 — Glazing Guidelines for Sealed Insulating Glass Units

NATIONAL INSTITUTE OF JUSTICE STANDARD FOR BALLISTIC RESISTANT PROTECTIVE MATERIALS (NIJ)

1. NIJ STANDARD 0180.01.

UNDERWRITERS LABORATORY (UL)

1. UL 9 — Fire Tests of Window Assemblies
2. UL 752 — Standard for Bullet Resisting Equipment

1.4 STANDARDS

A. Glazing Standards:

1. Comply with recommendations of the GANA Glazing Manual and the GANA Sealant Manual except where more stringent requirements are indicated.

2. System design and glass selection for exterior use shall be verified by the Contractor as being in compliance with wind loading requirements of the applicable local building code.

3. All documentation required by the local authority having jurisdiction to verify code compliance, including engineering calculations, shall be submitted for approval.

B. Safety Glazing Standard: Comply with ANSI Z97.1 and testing requirements of 16 CFR 1201 for Category II materials. Provide safety glass permanently marked with certification label of SGCC (Safety Glass Certification Council).

C. Fire-Resistance Rated glass: Provide fire-rated clear and wireless glass that has been tested in compliance with UL 263, ASTM E 119 and labeled and listed by UL.

D. Insulating Glass: Conform to ASTM E 774 and the requirements of SIGMA (Sealed Insulating Glass Manufacturers Association). Units shall be permanently marked on spacer or on one pane with certification label of the Insulating Glass Certification Council (IGCC).

E. Bullet Resistant Glass: Comply with ASTM F 1233, NIJ 0180.01 or UL 752 standards. Provide level 3 protection.

F. Laminated Glass: Conform to the standards of GANA’s Laminated Glass Design Guide. Provide laminated glass when required to comply with local codes.

G. Float Glass (Annealed): Conform to ASTM C 1036 requirements indicated by type, class, quality and form.

H. Heat-Treated Glass: Conform to ASTM C 1048 requirements indicated by type, class, quantity, style and grade.

I. Sizes: Fabricate to sizes shown on drawings as required, with edge clearances and tolerances complying with GANA’s publications and recommendations of glass manufacturer. Provide thickness indicated or as recommended by glass manufacturer for application intended.

G Sizes: F

1.5 SUBMITTALS

A. (SD-01)(SD-02) Manufacturer's Product Data: Submit data and installation instructions for each type of glass and each glazing material required. Include test data substantiating that materials comply with specified requirements and certificates stating materials comply with requirements.

B. (SD-09) Test Reports: Submit sealant-substrate adhesion and sealant compatibility test reports including glazing sealant manufacturer's findings and recommendations. Reports shall include each type glazing and each type installation.

C. (SD-15) Samples: Provide 12 x 12-inch square sample of each glass type, tint, coating, and reflectance specified. Provide 12-inch long sample of each sealant and gasket indicating color and shape to be used.

1.6 WARRANTY

A. (SD-14) Provide manufacturer's standard 10-year warranty for sealed insulating glass units.

B. Laminated Glass: Provide manufacturer's standard 4-year warranty against manufacturing defects including edge separation and delamination.

C. Reflective Glass: Provide manufacturer's standard 5-year warranty against manufacturing defects including peeling, cracking, or deterioration of metallic coating.

D. Insulating Glass: Provide manufacturer's standard 10-year warranty against loss of seal for the air space of the insulating unit.

PART 2 - PRODUCTS

2.1 MANUFACTURERS – TYPICAL GLASS

A. Subject to requirements indicated, provide products manufactured by one of the following:

1. Basis of Design is Viracon, Inc.

2. Guardian Industries Corp.

3. Pilkington Building Products North America

2.2 FABRICATORS

A. Subject to requirements indicated, provide products fabricated by one of the following:

1. Viracon, Inc.

2. Guardian Industries Corp.

3. Interpane Glass Co.

2.3 FLAT GLASS

A. Clear Float Glass: ASTM C 1036, Type I, Class 1, Quality q^3, ¼-inch thick, except as otherwise specified or indicated.

B. Tinted, Heat-Absorbing Glass: ASTM C 1036, Type I, Class 2, Quality q^3, ¼-inch thick, except as otherwise specified or indicated.

C. Clear Fire-Rated Glass:

1. ASTM E 119, high visible, 78% light transmission with intumescent interlayer.

2. Provide for labeled fire doors and sidelights and other locations indicated on drawings.

2.4 HEAT-TREATED GLASS

A. Conform to ASTM C 1048. Manufactured by horizontal (roller hearth) process with roll wave distortion parallel with bottom edge of glass as installed.

B. Heat Strengthened Glass: Float glass, Condition A uncoated and Condition B coated, ASTM C 1036, Style 1, Class 1, Type 1, Quality q, which has been heat-strengthened to increase flexural strength of glass.

C. Kind FT Fully Tempered: For safety glazing in storefront type doors and sidelights and other locations required by governing code, provide Kind FT glass of the type, tint, and thickness specified or indicated on drawings for the location. Insulating glass units for sidelights, both inboard and outboard lights, shall be tempered. All storefront type doors shall be single glazed with azurlite tinted, tempered glass kind FT.

1. Outboard lights of tinted laminated and insulating units, meeting wind load requirements and, not required to be safety glazing, may be furnished with Kind HS glass.

2.5 LAMINATED GLASS

A. Conform to ASTM C 1172, two pieces clear, tinted or Low E**,** Kind HS, Heat Strengthened, Glass of equal thickness as required, laminated together with a clear poly vinyl butyral (PVB) or (SAF) to a minimum thickness and quantities, interlayer required to meet NOA and or Florida Product Approvals.

2.6 EXTERIOR GLAZING

A. Curtainwall Glass: 1 5/16" VNE6-63 IS LAMI FT/HS/HS
¼” (6mm) BlueGreen FT VNE-63 #2
½” (13.2 mm) spacer-black-argon
¼” (6mm) Clear HS
.045” (1.14 mm) clear PVB
.045” (1.1.4mm) clear PVB
¼” (6mm) Clear HS

B. Automatic Entrances Glass: 5/8” Impact rated to match Tint/Color of Curtain wall glass.
¼” HS Tinted
.015” SAF Glass Interlayer
1/8” Polycarbonate (NOA #13-1105.10
.015” SAF Glass Interlayer
¼” HS Clear

2.7 GLAZING AT INTERIOR WALLS

A. Type: Monolithic, clear, tempered, minimum 1/4-inch thick.

B. Supports: Top and bottom, butt glazed.

2.8 MIRRORS

A. Glass: Clear float glass ASTM C 1036 Type I, Class 1, Quality q^2 mirror, ¼-inch thick.

B. Mirror Coating: Silver coating, copper protective coating and non-metallic coating conforming to FS A-A-3002.

2.9 GLAZING SEALANTS AND COMPOUNDS

A. Comply with recommendations of sealant and glass manufacturers for the required application and condition of installation. Provide only compounds which have been tested and proven to be fully compatible with surfaces contacted.
B. Per NOA and Product approval test

2.10 GLAZING GASKETS

A. Type, size and material recommended by glass and frame manufacturers for exterior, exposed, watertight installation of glass, with only nominal pressure in the glazing channel; comply with ASTM D 1667.
B. Per NOA and Product Approval test.

2.11 MISCELLANEOUS GLAZING MATERIALS

A. Setting Blocks: Neoprene, EPDM or silicone, 80-90 Shore A durometer hardness, with proven compatibility with sealants used.

B. Spacers and Edge Blocks: Neoprene EPDM or silicone, of hardness as recommended by glass manufacturer with proven compatibility with sealants used.

C. Backer Rod: Closed-cell or waterproof-jacketed rod stock of synthetic rubber or plastic foam, proven to be compatible with sealants used, flexible and resilient, with 5-10 psi compression strength for 25% deflection.

D. Cleaners, Primers and Sealers: Type recommended by glass, sealant and gasket manufacturers.

E. Mirror Adhesive: Type recommended by mirror and adhesive manufacturer for spot-application system, with mirror supported only at lower edge. Provide Mirror-Mastic and recommended primer and mirror back paint by Palmer Products Corp. or approved equivalent

PART 3 - EXECUTION

3.1 STANDARDS AND PERFORMANCE

A. Glass shall be installed watertight and airtight. The glazed installation shall withstand normal temperature changes, wind loading and impact loading for doors without failure of sealants or gaskets to remain watertight and airtight, deterioration of glazing materials and other defects in glazing systems.

B. Protect glass from edge damage at all times during handling and installation.

C. Comply with recommendations of glass manufacturer and manufacturer of sealants and other materials used in glazing.

D. Comply with FGMA Glazing Manual except as shown and specified otherwise, and except as specifically recommended otherwise by the manufacturers of the glazing materials.

E. Inspect each piece of glass immediately before installation, and eliminate each piece which has observable edge damage or face imperfections.

F. Unify appearance of each series of lights by setting each piece to match others as nearly as possible. Inspect each piece and set with pattern, draw and bow oriented in the same direction as other pieces.

G. Install sealants as recommended by sealant manufacturer.

3.2 PREPARATION FOR GLAZING

A. Clean the glazing channel, or other framing members to receive glass, immediately before glazing. Remove coating which is not firmly bonded to the substrate. Remove lacquer from metal surfaces wherever elastomeric sealants are used.

B. Apply primer or sealer to joint surfaces wherever recommended by sealant manufacturer.

3.3 GLAZING

A. Install setting blocks of proper size at quarter points of sill rabbet. Set blocks in thin course of the heelbead compound.

END OF SECTION 08 80 00

SECTION 08 90 00 - LOUVERS AND VENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawing and General Conditions/Provisions of Contract, General Conditions, Supplemental Conditions, and other Division 1 Specification Sections Apply to this Section.

B. Extent of louvers and vents is indicated on drawings, including indications of sizes and locations.

1.2 SUMMARY

A. Types of louvers and vents include the following to the extent of extruded aluminum louvers to match the profile, function, appearance, and finish as shown on the drawing and specification herein.

B. Louver assemblies furnished to include Florida Product Approval assembly and or NOA.

1.3 REFERENCES

A. Air Movement and Control Association International, Inc.:

B. The Aluminum Association, Inc.:

C. American Society of Civil Engineers (ASCE):

D. American Society for Testing and Materials (ATSM):

E. FBC/Miami-Dade County Test Protocols:

F. Architectural Aluminum Manufacturers Association (AAMA):

1.4 QUALITY ASSURANCE

A. Performance Requirements:

B. AMCA Certification:

C. Comply with SMACNA "Architectural Sheet Metal Manual" recommendation for fabrication, construction details and installation procedures, except as otherwise indicated.

D. Shop Assembly:

1.5 SUBMITTALS

A. As per Section 01 33 23 Shop Drawings, Product Data and Samples, provide as follows:

1. (SD-01)(SD-02) Product Data for each product specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.
2. (SD-04) Shop Drawings:
3. (SD-15) Samples for verification of each type of exposed finish required in manufacturer's standard sizes. Where finishes involve normal color and texture variations, include Sample sets showing the full range of variations expected.
4. (SD-11) Certification: Product test reports from a qualified independent testing agency evidencing compliance
5. (SD-13) Product Acceptance: Florida Product Approvals or Miami Dade NOA in compliance with Project Requirements

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. GREENHECK, P.O. Box 410, Schofield, WI 54476-0410, 715-359-6171, Greenheck.com.

B. Or approved equal.

2.2 PRODUCT

A. EHV-550D -Enhaced Level E- Wind-Driven Wind-Driven Rain Louver Dual Module, NOA No.19-0430.03, Florida Product Approval No. FL 30291

B. Or approved equal.

2.3 MATERIALS

A. Frame: Aluminum 5.5" deep extruded 0.081".

B. Blades: 6005-T5 extruded aluminum

C. Screen: 3/4" x.051" square mesh aluminum bird screen in removable frame

D. Finish: Clear Anodize 215 R-1 AA-M10C22A41 (>0.4-0.7 mil).

E. Anchors and Inserts: Use non-ferrous metal or stainless-steel anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use stainless-steel

expansion bolt devices for drilled-place anchors. Furnish inserts, as required to be set into concrete or masonry work. Use fasteners compatible with adjacent materials.

F. Bituminous Paint: SSPC-Paint 12 (cold-applied mastic).

2.4 ACCESSORIES

A. Provide Bird/Insect Screen.

B. Provide 1 “ insulated Blank Off Panel with .05” Aluminum facing Custom cut as required.

2.5 FABRICATION, GENERAL

A. Provide louvers and accessories of design, materials, sizes, depth, arrangement, and metal thicknesses indicated, or if not indicated, as required for optimum performance with respect to airflow; water penetration; air leakage where applicable (for adjustable units, if any); strengths; durability; and uniform appearance.

B. Fabricate frames including integral sills to suit adjacent construction with tolerances for installation, including application of sealants in joints between louvers and adjoining work.

C. Include support, anchorages, and accessories required for complete assembly. Provide and install additional aluminum channels, angles, girts to span the opening.

D. Provide sill extensions and loose sills made of the same materials as the louver, where indicated, or required for drainage to exterior and to prevent water penetrating to interior.

E. Join frame members to one another and to stationary louver blades by welding, except where indicated otherwise or where necessary by size of louvers. Maintain equal blade spacing including separation between blades and frames at head and still to produce uniform appearance.

F. Provide additional structural aluminum framing as indicated on the drawings.

G. Louver Screens: Provide removable screens for louvers. Mount on the exterior color to match louvers.

H. Metal Finishes: General: Comply with NAAMM "Metal Finishes Manual" for finish designations and applications recommendations, except as otherwise indicated. Apply finishes in factory after products are assembled. Protect finishes on exposed surfaces with protective covering, prior to shipment. Remove scratches and blemishes from exposed surfaces that will be visible after completing finishing process. Finish of all louvers exposed to exterior view are to be of color to match frames.

I. Ferrous Metal Finishes: Preparation: clean surfaces of dirt, grease, and loose rust or mill scale, including items fabricated from galvanized steel, if any. Apply finish to surfaces of

fabricated and assembled units, where exposed or concealed when installed, after pretreating with a conversion coating suited to organic coating applied over it.

J. Coordinate with Mechanical Contractor for the inter phase detail of louver and duct.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages which are to be embedded in concrete or masonry construction. Coordinate delivery of such items to project site.

3.2 INSTALLATION

A. Locate and place louver units plumb, level, and in proper alignment with adjacent work.

B. Use concealed anchorage wherever possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weather-tight connection.

C. Form tight joints with exposed connections accurately fitted together. Provide reveals and openings for sealants and joint fillers as indicated.

D. Repair finishes damage by cutting, welding, soldering and griding operations required for fitting and jointing. Restore finishes so there is no evidence of corrective work. Return items that cannot be refinished in the field to shop make required alternations, and refinish entire unit, or provide new units, at Contractor's option.

E. Protect galvanized and non-ferrous metals surfaces from corrosion or galvanic action by application of heavy coating of bituminous paint on surfaces that will be in contact with concrete, masonry or dissimilar metals.

F. Provide concealed gaskets, flashings joints fillers, and insulations, and install as work progresses to make the installations weathertight.

G. Refer to Division 7 section for sealants in connection with installations of louvers.

H. Provide and install 1/8”-thick Stainless Steel ‘Z’ Flashing with soldered vertical sides (three (3) sides) and drip with clip to exterior for louver/damper drainage.

END OF SECTION 08 90 00

SECTION 09 21 16 - GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide gypsum drywall work shown on drawings and specified.

1.2 RELATED SECTIONS

A. Section 05 40 00, "LIGHT GUAGE STEEL FRAMING"

B. Section 07 92 00, "JOINT SEALANTS"

C. Section 09 21 18, "GYPSUM BOARD SHAFT WALL ASSEMBLIES"

D. Section 09 22 16, "INTERIOR METAL FRAMING"

E. Section 09 22 26, "METAL SUSPENSION SYSTEM"

F. Section 09 30 00, "TILING"

G. Section 09 81 00, "ACOUSTICAL INSULATION"

1.3 REFERENCE STANDARDS

A. The latest edition of publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

1.	ANSI A108.1	Installation of Ceramic Tile - A Collection
2.	ANSI A118.9	Test Methods and Specifications for Cementitious Backer Units (Available only as part of ANSI A108.1)

ASTM INTERNATIONAL (ASTM)

1.	ASTM A 653/A 653M	Design of Cold-Formed Steel Structural Members
2.	ASTM C 36/C 36M	Gypsum Wallboard
3.	ASTM C 442/C 442M	Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board

4.	ASTM C 475	Joint Compound and Joint Tape for Finishing Gypsum Board
5.	ASTM C 630/C 630M	Water-Resistant Gypsum Backing Board
6.	ASTM C 645	Nonstructural, Steel Framing Members
7.	ASTM C 665	Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
8.	ASTM C 754	Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
9.	ASTM C 840	Application and Finishing of Gypsum Board
10.	ASTM C 919	Use of Sealants in Acoustical Applications
11.	ASTM C 954	Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 Inch (0.84 mm) to 0.112 Inch (2.84 mm) In Thickness
12.	ASTM C 1177/C 1177M	Glass Mat Gypsum Substrate for Use as Sheathing

UNITED STATES GYPSUM CO. (USG)

1. Gypsum Construction Handbook 7th edition

1.4 QUALITY ASSURANCE

A. ASTM Standards: Comply with applicable requirements.

B. Fire Resistance Ratings: Provide assemblies that have been tested, approved and listed by Underwriter's Laboratories, Inc., FM Global or other testing agency acceptable to local authorities and code.

1.5 SUBMITTALS

A. (SD-01)(SD-02) Submit manufacturer's product data, specifications and installation instructions for each product, system and component.

B. (SD-04) Submit shop drawings for details not in manufacturer's data. Include drawings locating ceiling and wall control joints as required by ASTM C 840 and

drywall manufacturer. Control joint location is subject to approval by the Architect.

C. (SD-10) Submit a copy of the test(s) reports for each proposed Fire-Resistance Rated assembly.

D. (SD-18) Submit samples of all accessories edges, corners, transitions and termination.

1.6 PRODUCT HANDLING

A. Deliver materials in sealed containers and bundles, fully identified with manufacturer's name, brand, type, and grade. Store in a dry, well ventilated space, protected from the weather and off the ground.

PART 2 - PRODUCTS

2.1 SUSPENDED CEILING FRAMING AND FURRING or as indicated on the drawings.

A. Comply with ASTM C 754 and manufacturer's recommendations.

B. Ceiling Suspension Main Runners: ASTM C 754, 1½-inch steel channels, 0.475 pounds per foot, cold-rolled, galvanized.

1. Hanger Wire: ASTM C 754 galvanized, soft annealed steel wire, sized in accordance with Table 5, ASTM C 754.

2. Hanger Anchorage Devices: Size for 3 x calculated loads, except size direct-pull concrete inserts for 5 x calculated loads.

3. Steel Furring: ASTM C 645; 25 gage, hat-shaped, galvanized.

C. Direct Hung Suspension System: In lieu of suspended main runner channels and hat-shaped furring, a direct hung system of tees or channel studs may be provided. Members shall be prepared to receive screw attached gypsum board and system shall have structural strength and rigidity equal to the suspended main runner system.

2.2 STEEL STUD FRAMING AND FURRING

A. Steel Studs: Conform to ASTM C 645; 25-gage minimum**;** ASTM A 653/A 653M galvanized steel; profile, size and spacing shown on drawings. Gage of metal shall be increased in accordance with ASTM C 754 Table 3 or manufacturer's limiting height tables so that deflection shall not exceed L/240 at 10 psf.

B. Stud Accessories: Provide galvanized steel.

1. Runners: Provide type recommended by stud manufacturer to match studs, for floor and ceiling support of studs, and for abutment to other work.

2. Stud System Accessories: Provide stud manufacturer's standard reinforcements, fasteners and other accessories.

3. Deflection Clips: Provide attachment system or clips for attachment of studs to head track designed to permit deflection of structure without transferring vertical loading to the studs where studs extend from floor to underside of floor above.

C. Steel Furring: ASTM C 645; 25-gage, hat-shaped, galvanized.

D. Steel Furring Resilient: ASTM C 645, 25-gage, manufacturer's standard design to reduce sound transmission.

E. Wire Mesh: ASTM F 2453, 9 gage galvanized expanded wire metal mesh.

F. Fasteners for Steel: ASTM C 954; size recommended by gypsum board manufacturer.

2.3 GYPSUM WALLBOARD

A. Manufacturers:

1. Georgia-Pacific Gypsum, LLC
2. National Gypsum Co.
3. United States Gypsum Company.

B. Provide Gypsum Board of types indicated in maximum lengths available to minimize joints.

1. Thickness: Provide Gypsum Boards ¼”, 5/8” and 1” thick comply with ASTM C840 for application system and support spacing and assembly indicated.

B. Regular Gypsum Wallboard: ASTM C 36/C 36M, regular type with tapered long edges.

1. Sheet Size: Maximum length available by 4'-0" wide.

2. Thickness: Shall be ⅝-inch unless otherwise indicated**.**

3. Use sag-resistant type for ceiling surfaces.

B. Fire Retardant Gypsum Wallboard: ASTM C 36/C 36M, Type X, provide where fire rated construction is indicated.

1. Size: 4-foot wide sheets by maximum length available.

2. Thickness: Shall be ⅝-inch unless otherwise indicated.

C. Gypsum Backing Board and Coreboard: ASTM C 442/C 442M, Type X, coreboard with moisture-resistant paper facings in thickness indicated for system required for rated assembly.

D. Gypsum Sheathing Board: ASTM C 1177, glass mat faced, Type X, water resistant core and surface paper. Sheet size: Maximum length available for intended use by 4'-0" wide by 5/8-inch thick.

E. Abuse Resistant Board: ASTM D 4977; gypsum core encased in heavy smooth abrasion 100% recycled paper on the face side and heavy mold/mildew-resistant liner paper on the back side. Type X, 5/8-inch thick.

F. Impact Resistant Wallboard: ASTM C 1278, ASTM C 1629, ASTM C 1658; gypsum core encased in heavy smooth abrasion-resistant mold/mildew-resistant, recycled paper on the face side and heavy mold/mildew-resistant, liner paper on the back side. A fiberglass mesh is embedded in the board. Type X, 5/8-inch thick.

G. Tile Backer Boards: Georgia -Pacific Gypsum LLC: Impact-Resistant Fiberglass-Mat Faced Gypsum Board: DensArmor Plus Impart-Resistant Panel is the basis of design or approved substitution.

1. Exposed side -Impact-Resistant Fiberglass-Mat Faced Gypsum Board:

a.Thickness: 5/8"

b.Width: 4'

c.Length: 8'

d.Weight: 2.8 lb/sq. ft.

e.Edges: Tapered

f.Surfacing: Coated fiberglass mat on face, back, and long edges

g. Flexural Strength, Parallel (ASTM C473, ASTM C1658): Not less than 100 lbf.

h. Flexural Strength, Perpendicular (ASTM C473, ASTM C1658): Not less than 140 lbf.

i. R-Value (ASTM C518): 0.67

j. Nail Pull Resistance (ASTM C473, ASTM C1658): Not less than 90 lbf.

k. Humidified Deflection (ASTM C473, ASTM C1658): Not less than 1/8"

m. Hardness, Core, Edges, and Ends (ASTM C473, ASTM 1396, ASTM C1658): Not less than 15

o. Water Absorption (ASTM C630, ASTM C1396, ASTM C1658): Less than 5% of weight

p. Mold Resistance (ASTM D3273): 10, in a test as manufactured

q. Microbial Resistance (ASTM D6329, EPA 12-week protocol): Will not support microbial growth

r. Abuse Resistance (ASTM C1629):

1. Surface Abrasion: Level 3

2. surface Indentation: Level 1

3. Soft-Body Impact: Level 3

4. Hard-Body Impact: Level 2

2.4 TRIM ACCESSORIES

A. Provide galvanized steel trim accessories manufactured by U.S. Gypsum Company, or approved equivalent.

1. Casing Trim: USG No. 200 series, type as detailed.

2. Corner Beads: USG NO. 103 Durabead reinforcement, 1¼" x 1¼".

4. Control Joints: USG No. 093.

C. Manufacturer: Fry Reglet Architectural Co. 800-237-9773. Basis of design. OR APPROVED SUBSTITUTION

1. Reveal Base:
   a. Acceptable Product: Number DRMB
   b. Characteristics:
      i. Description: Reveal base shall from damage-resistant base at bottom of wall.
      ii. Material: Extruded Aluminum
      iii. Dimensions: As indicated on the drawings
      iv. Radius: As indicated on the drawings
      v. Finish: Mill Finished Aluminum

2. Expansion Joint:
   a. Acceptable Product: Number DRM-5, 3-piece
   b. Characteristics:
      i. Description: 3-piece expansion joint with compression seals to prevent cracking of drywall joints caused by minor settling of the building. Maximum amount of movement is 3/8”
      ii. Material: Extruded Aluminum
      iii. Dimensions: As indicated on the drawings
      iv. Radius: As indicated on the drawings
      v. Finish: Mill Finished Aluminum

3. “F” Reveal:
   a. Acceptable Product: Number FDM
   b. Characteristics:
      i. Description: Reveal shall create a wall reveal transition between ceiling and wall or other building materials.
      ii. Material: Extruded Aluminum
      iii. Dimensions: As indicated on the drawings
      iv. Radius: As indicated on the drawings
      v. Finish: Mill Finished Aluminum

2.5 JOINT TREATMENT MATERIALS

A. Comply with ASTM C 475.

B. Joint Tape: U.S. Gypsum Perf-A-Tape and U.S. Gypsum Imperial type P or S for water-resistant wallboard or approved equivalent by Georgia Pacific or National Gypsum Co.

C. Joint Compound: U.S. Gypsum All-Purpose Ready-Mixed Joint Compound, vinyl tape or approved equivalent by Georgia Pacific or National Gypsum Co.

2.6 MISCELLANEOUS MATERIALS

A. Fastening to Metal: Screws, ASTM C 954.

B. Spot Grout: ASTM C 475, setting-type joint compound of type recommended for spot grouting hollow metal door frames.

C. Nine gauge expanded wire mesh attached to metal studs before application of gypsum board.

1. Refer to drawings for locations.

2.7 SOUND INSULATION

A. Refer to Section 09 81 00 ACOUSTICAL INSULATION

2.8 ACOUSTICAL SEALANT

A. Non-drying, non-hardening, non-skinning, non-staining, gunnable synthetic rubber sealant complying with requirements of SECTION 07 92 00 - JOINT SEALANTS.

PART 3 - EXECUTION

3.1 INSTALLING STEEL FRAMING AND FURRING, GENERAL

A. Comply with ASTM C 754 for installation of steel framing members; ASTM C 1007 for load bearing partitions, and manufacturer's instructions for screw attachment of gypsum board.

B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, trim, grab bars, toilet accessories, furnishings or other similar items supported from ceiling or partition framing. Comply with details indicated and with recommendations of gypsum board manufacturer or, if none available, with "Gypsum Construction Handbook" published by U. S. Gypsum Company.

C. Installation Tolerances:

1. Install framing to an alignment tolerance not to exceed ⅛-inch in 10-feet vertically and horizontally. Square corners to a tolerance not to exceed ⅛-inch in 4-feet each side of corner.

2. Install steel framing components for suspended ceilings so that cross-furring members or grid suspension members are level to within ⅛-inch in 12-feet as measured both lengthwise on each member and transversely between parallel

members.

D. Do not bridge building expansion joints with support system, frame both side of joints with furring and other support as indicated.

3.2 INSTALLING CEILING FRAMING

A. Space ceiling suspension main runners not more than 4'-0" o.c., and space hangers at not more than 4'-0" o.c. along runners unless shown otherwise. Coordinate ceiling framing with structure. Provide additional hangers and runners to support electrical, mechanical, system and other work indicated and required.

B. Space ceiling furring members 16-inches o.c., except as otherwise indicated on drawings.

D. Attach furring members to main ceiling runners and to other structural supports as indicated and in accordance with ASTM C 754 and manufacturer's directions.

3.3 INSTALLING STEEL FRAMING FOR PARTITIONS AND WALLS

A. Install steel studs and furring in sizes and at spacings indicated but not less than that required by the referenced steel framing installation standard to comply with maximum loading requirements specified.

B. Space studs at 16-inches o.c. unless otherwise indicated on drawings.

C. Terminate partition stud system at ceilings, except where shown to be extended to structural support or substrate above.

D. Door Frames: Install a minimum of two jamb studs at door frames. Space jack studs over door frames at same spacing as partition studs.

E. Space wall furring members 16-inches o.c. unless otherwise indicated on drawings.

F. Provide and install supplemental blocking for support at all accessories. See drawings for accessories location.

3.4 SHAFT WALL SYSTEM

A. Install gypsum board shaft wall system to comply with performance and other requirements indicated as well as with manufacturer's installation instructions.

B. Install supplementary framing, blocking and bracing to support gravity and pull-out loads of fixtures, equipment, services, trim, furnishings and similar work which cannot

be adequately supported directly by regular framing of gypsum board shaft wall system. Provide additional reinforcement for vertical bracing and deflection control due to wall height or span.

1. Where handrails are indicated for direct attachment to gypsum board shaft wall system, provide not less than a 0.0341-inch thick by 4- inch wide galvanized steel reinforcement strip, accurately positioned and secured behind not less than one gypsum board face layer of ½-inch or ⅝-inch thickness.

C. Isolate shaft wall system from transfer of structural loading to system, both horizontally and vertically. Provide slip or cushioned type joints to attain lateral support and avoid axial loading. Comply with details indicated and with manufacturer's instructions.

D. Seal gypsum board shaft walls at perimeter of each section which abuts other work and at joints and penetrations within each section. Install acoustical sealant to withstand dislocation by air pressure differential between shaft and external spaces. Comply with ASTM C 919 and manufacturer's instructions.

3.5 FIRE RATED ASSEMBLIES

A. Installation, spacing of framing members and spacing of fasteners shall conform to the UL test report of each fire rated assembly.

B. Fire rated walls and partitions shall extend to floor or roof construction above. Install UL listed joint details in compliance with fire rated assmply.

3.6 GYPSUM WALLBOARD INSTALLATION

A. Comply with ASTM C 840 systems as listed below, manufacturer's instructions and the requirements specified and indicated for fire-resistance ratings.

1. System VIII; Application of Gypsum Board to Steel Framing and Furring.

2. System X; Application of Gypsum Board to Receive Tile by Adhesive Application.

3. System XIII; Control (Expansion) Joints.

B. Space Fasteners in wallboard in accordance with ASTM C 840.

3.7 INSTALLATION TRIM ACCESSORIES

A. Use the same screw fasteners to anchor trim necessary flanges as required to fasten

gypsum board to the supports. Stapling flanges is not permitted.

B. Install corner beads at external corners of gypsum board work.

E. Install edge trim whenever edge of wallboard would otherwise be exposed or semi-exposed. Install L-type trim where work is tightly abutted to other work, and install U-type trim where indicated and where edge is exposed.

3.8 SOUND ATTENUATION BLANKETS

A. Install in accordance with manufacturer's directions.

B. Provide in partitions and walls indicated for sound insulation.

C. Provide in fire-rated partitions and walls when mineral wool blankets are part of the test for fire rating.

3.9 WALLBOARD FINISHING

A. Comply with ASTM C 840. Apply treatment at wallboard joints, flanges of trim accessories, penetrations, fastener heads, surface defects and everywhere as required for a Level 5 surface to prepare work for painting or other finish materials. Prefill open joints and beveled edges using type of compound recommended by manufacturer.

1. Apply joint tape at joints between wallboards, except where a trim accessory is to be provided.

2. Apply joint compound in three coats, not including prefill of openings in base, and sand after second coat and after last coat.

3. Where gypsum wallboard butts CMU walls and other work, provide appropriate sealant to resulting joint to completely fill void between wallboard and other work. Provide and install plumb corner bead.

3.10 FIELD QUALITY CONTROL

A. Above-Ceiling Observation: Before Contractor installs gypsum board ceilings, Architect will conduct an above-ceiling observation and report deficiencies in the Work observed. Do not proceed with installation of gypsum board to ceiling support framing until deficiencies have been corrected.

B. Notify Architect seven (7) days in advance of date and time when Project, or part of Project, will be ready for above-ceiling observation.

C. Before notifying Architect, complete the following in areas to receive gypsum board ceilings:

a. Installation of 80% of lighting fixtures, powered for operation.

b. Installation, insulation, and leak and pressure testing of water piping systems.

c. Installation of air-duct systems.

d. Installation of air devices.

e. Installation of mechanical system control-air tubing.

f. Installation of ceiling support framing.

g. Firestopping of penetrations and joints in fire rated assemblies.

h. Smoke sealing of penetrations and joints in smoke resistant assemblies.

3.11 CLEANING AND PROTECTION

A. Promptly remove all residual joint compound from adjacent surfaces. Protect adjacent finishes.

B. Provide final protection and maintain conditions, in a manner that ensures that gypsum board assemblies remain free from damage or deterioration at time of substantial completion.

END OF SECTION 09 21 16

SECTION 09 22 16 - INTERIOR METAL FRAMING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes: Interior metal wall, ceiling and rated steel wall and ceiling framing to the extent shown on drawings and specified herein.

1.2 SUBMITTALS

A. (SD-01) Product Data: Manufacturers cut sheets for all material and fastener.

B. (SD-04) Shop Drawings: Show both rated and non-rated deflection track details. Include testing laboratory's assembly number for the rated conditions.

C. (SD-05) Design analysis data showing design loads and stud gages for each condition. Submit Drawings and calculations prepared by a Florida Registered Engineer.

PART 2 - PRODUCTS

2.1 STEEL FRAMING FOR WALLS AND PARTITIONS

A. Provide steel framing members complying with the following requirements:

1. Component Sizes and Spacings: Comply with ASTM C 754 under the following maximum deflection and lateral loading conditions:

a. Maximum Deflection at 5 pound-foot per square foot:

1) Painted Interior Partitions: L/240
2) Tiled Interior Walls: L/270
3) Large Format Tiled Walls: L/360

2. Protective Coating: G-40 hot-dip galvanized coating per ASTM C 645. B.

Steel Studs and Runners: ASTM C 645

C. Fasteners for Metal Framing: Provide fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum board manufacturers for applications indicated.

D. Unless indicated otherwise, metal stud framing shall be formed from the following gage metal. If two conditions apply in the following listing, use the heavier gage:

1. Framed openings (heads and jambs of door and window openings) - 16 gage.

a. 16 gage studs include both (2) studs at each jamb, full height, and headers.

2. Remaining metal studs - 20 gage minimum or as necessary not to exceed the max allowable deflection.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 INSTALLING STEEL FRAMING, GENERAL

A. Steel Framing Installation Standard: Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation.

B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, wayfinding, monitor mounts or similar construction. Comply with details indicated and with recommendations of gypsum board manufacturer.

C. Isolate steel framing from building structure to prevent transfer of loading imposed by structural movement. Use vertical sliding slide clip application or use of deflection track and plate track two-piece system, or slip-joint with U-channel.

1. Where building structure abuts ceiling perimeter or penetrates ceiling.
2. Where partition framing and wall furring abut structure, including steel beams, steel joists, at bottom of roof decks and floor decks, except at floor.

a. Provide slip-type joints to attain lateral support and avoid axial loading.

3. Rated Deflection Track: Maintain continuity of fire-resistance-rated assembly indicated.

D. Do not bridge building expansion and control joints with steel framing or furring members. Independently frame both sides of joints with framing or furring members as indicated.

3.3 INSTALLING STEEL FRAMING FOR SUSPENDED AND FURRED CEILINGS

A. Suspend ceiling hangers from building structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by

bracing, counters playing, or other equally effective means.

2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.

3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
4. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure as well as for type of hanger involved, and in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
5. Do not support ceilings directly from permanent metal forms.
6. Do not attach hangers to steel deck tabs.
7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
8. Do not connect or suspend steel framing from ducts, pipes or conduit.

B. Sway-brace suspended steel framing with hangers used for support.

C. Install suspended steel framing components in sizes and at spacings indicated but not less than that required by the referenced steel framing installation standard.

1. Wire Hangers: 0.1620-inch (8-gage) diameter, 4 feet o.c.
2. Carrying Channels (Main Runners): 2-1/2 inch, 4 feet o.c.
3. Rigid Furring Channels (Furring Members) 7/8": 24 inches o.c.

D. For ceiling grid suspension system, comply with manufacturer's instructions.

E. Installation Tolerances: Install steel framing components for suspended ceilings so that cross-furring members or grid suspension members are level to within 1/8 inch in 12 feet as measured both lengthwise on each member and transversely between parallel members.

F. Wire-tie or clip furring members to main runners and to other structural supports as indicated.

3.4 INSTALLING STEEL FRAMING FOR WALLS AND PARTITIONS

A. Install runners (tracks) at floors, ceilings, and structural walls and columns where gypsum board stud assemblies abut other construction.

1. Where metal framing is installed directly against exterior walls, install asphalt felt strips between studs and wall.

B. Extend partition framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Cut studs 1/2 inch short of full height. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.

C. Install steel studs and furring in sizes and at spacing indicated but not less than that required by the referenced steel framing installation standard to comply with maximum deflection and minimum loading requirements specified.

1. Install metal studs at 16 inches o.c. at partitions scheduled to receive tile finishes.
2. Radius walls install at 4 inches o.c. at partitions to create the radius wall.

D. Install steel studs so that flanges point in the same direction and so that leading edges or ends of each gypsum board can be attached to open (unsupported) edges of stud flanges first.

E. Frame door openings to comply with details indicated, with GA-219, and with applicable published recommendations of gypsum board manufacturer or as indicated on drawings. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.

1. Extend vertical jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

F. Frame openings other than door openings in same manner as required for door openings. Install framing below sills of openings to match framing required above door heads.

G. For UL rated construction follow UL listed assembly requirements for installation.

END OF SECTION 09 22 16

SECTION 09 22 26 - METAL SUSPENSION SYSTEMS

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

Drawings and general conditions of Contract, including General and Supplementary Conditions and Divisions-1 Specification sections apply to work of this section.

1.2 SUMMARY

A. Section Includes:

1. Suspension System Framing and Furring for Plaster and Gypsum Board Assemblies
2. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.

B. Related Sections:

1. Section 09 21 16, “Gypsum Board Assemblies”
2. Section 09 51 13, “Acoustical Panel Ceilings”
3. Division 21 Sections - Fire Sprinkler specifications on drawings
4. Division 23 Sections – HVAC Work
5. Division 26 Sections - Electrical Work
6. Division 27 Sections - Communications Work
7. Division 28 Electronic Safety and Security

1.3 REFERENCES

A. American Society for Testing and Materials (ASTM):
1. ASTM A 641 Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
2. ASTM A 653 Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process
3. ASTM A 1008 Standard Specification for Steel, Sheet, Cold Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
4. ASTM D 610 Standard Test Method for Evaluating Degree of Rusting on Painted Steel Surfaces
5. ASTM B 117 Standard Practice for Operating Salt Spray (Fog) Apparatus
6. ASTM C 635 Standard Specification for Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
7. ASTM C 636 Recommended Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
8. ASTM C 1858 Standard Practice for Design, Construction, and Material Requirements for Direct Hung Suspended T-bar Type Ceiling Systems Intended to Receive Gypsum Panel Products in Areas Subject to Earthquake Ground Motions

9. ASTM C 645 Standard Specification for Nonstructural Steel Framing Members
10. ASTM C 754 Installation of Steel Framing Members to Receive Screw-Attached Gypsum Board
11. ASTM C1002 Standard Specification for Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases
12. ASTM E 119 Standard Test Method for Fire Tests of Building Construction and Material (if applicable)
13. NOA #15-0127.04 Miami/Dade Wind Uplift
14. NOA #14-1204.05 Miami/Dade Impact
15. ESR-1289 ICC-ES Evaluation Report

1.4 SUBMITTALS

A. (SD-01)(SD-02) Product Data: Submit manufacturer's technical literature.

B. (SD-15) Samples: 8 inch long samples of suspension system components, including main runner, cross tees, and angle molding.

C. (SD-13) Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards.

D. (SD-05) Design Data: Calculations depicting spacing, size and hanger wire. Calculations signed and sealed by a Florida Registered Professional Engineer.

1.5 QUALITY ASSURANCE

A. Single-Source Responsibility: To ensure proper interface, all drywall furring components shall be produced or supplied by a single manufacturer.

B. All accessory components from other manufacturers shall conform to ASTM standards.

C. Fire Resistance Ratings: As indicated by reference to design designations in UL Fire Resistance Directory, for types of assemblies in which drywall ceilings function as a fire protective membrane and tested per ASTM E 119. Installation in accordance with the UL Design being referenced.

E. Coordination of Work:

1. Coordinate drywall furring work with installers of related work including, but not limited to: acoustical ceilings, building insulation, gypsum board, light fixtures, mechanical systems, electrical systems, and sprinklers.

2. All work above the ceiling line should be completed prior to installing the drywall sheet goods. There should be no materials resting against or wrapped around the suspension system, hanger wires or ties.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.

1.7 WARRANTY

A. Suspensions System: Submit a written limited warranty executed by the manufacturer, agreeing to repair or replace grid components that are supplied with a hot-dipped galvanized coating or aluminum base material. Failures include, but are not limited to the occurrence of 50% red rust as defined by ASTM D 610 test procedures as a result of defects in materials or factory workmanship.
B. Warranty Period:
Grid: Ten years from date of installation.
C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 – PRODUCTS

2.1 MANUFACTURERS

A. Suspension Systems: Basis of Design Armstrong World Industries, Inc.
B. Or Approved substitution

2.2 SUSPENSION SYSTEMS

A. Components:

1. Main Beam: Shall be double-web construction (minimum 0.0179 inch prior to protective coating, ASTM C645), hot dipped galvanized (per ASTM A653).

a. HD8906/HD890610: 1-11/16 inch web height, 1-1/2 inch flange, available with G40 or G90 hot dipped galvanization.

2. Primary Cross Tees: Shall be double-web steel construction (minimum 0.0179 inch prior to protective coating, ASTM C645), hot dipped galvanized (minimum G40 or G90 per ASTM A653)

a. XL8945P: 48 inch, web height 1-1/2 inch with rectangular bulb and pre-finished 1-1/2 inch knurled flange

3. QuikStix Soffits DGS: Shall be double web steel construction (minimum 0.0179 inch prior to protective coating, ASTM C645), Tees designed for creating soffits;

1-1/2 inch web height. 1-1/2 inch flange, flattened bulb, bending crimp, knockouts and alignment holes to facilitate creating 15, 30, 45, 60, and 90 degree angles; available with G40 or G90 hot dipped galvanization.

a. QS612: 12 foot tee with knockouts 6 inches O.C., rout holes 6 inches O.C.

b. QS812: 12 foot tee with knockouts 8 inches O.C. rout holes 8 inches O.C.

4. Wall Molding:
   a. KAM -12: 12 foot Knurled Angle molding, 1-1/4 inch x 1-1/4 inch, knurled surface, screw stop hem, pre-punched holes in top flange, 4” O.C., .018 mil. 25g.
5. Transition Molding: Drywall to Acoustical ceiling.
   a. Pre-Painted Armstrong Global White integral acoustical flange and drywall taping flange, hot dipped cold rolled steel.

B. 7905: 120 inch with 9/16” flush horizontal flange.

1. Screws for wallboard application shall be bugle head screws in accordance with thickness of material used.

2. Metal Trim or Plastic Members:

a. Corner bead: Minimum #26 gauge, zinc alloy or plastic square edge type with expanded flanges

b. Casing bead: Minimum #24 gauge, zinc alloy or plastic square edge type with expanded flanges

c. Control Joints: Minimum #26 gauge, roll-formed zinc alloy, extruded aluminum or plastic with expanded flanges

d. Special Trim Shapes: As detailed on plans, extruded aluminum with acrylic coating by Fry Reglet or approved equal

e. Metal Lath: 3.4 lbs/square yard, galvanized 3/8 inch diamond mesh or flat rib lath; security lath for applications requiring high degree of security

2.3 STRUCTURAL CLASSIFICATION:

A. Main Beam shall be heavy duty per ASTM C 635.

B. Classification can require wires to be closer together for additional loading when used to support double layer gypsum, verticals, slopes, domes, half barrels, circles, soffits, canopies, and step conditions, which call for loading or unusual designs and shapes in drywall construction. Using cross tees in the construction of circles, barrels, etc. is common in order to hold the radius.

C. Deflection of fastening suspension system supporting light fixtures, ceiling grilles, access doors, verticals, and horizontal loads shall have a maximum deflection of 1/360 of the span.

PART 3 – EXECUTION

3.1 INSTALLATION – GENERAL

A. Install suspension system and panels in accordance with the manufacturer's instructions, in compliance with ASTM installation standard, and with applicable codes as required by the authorities having jurisdiction.

B. The Armstrong Drywall Grid System can be installed in interior or exterior applications.

C. To secure to metal clips, concrete inserts, steel bar joist or steel deck, use power actuated fastener, or insert. Coordinate placement for hanger wire spaced as required for expected ceiling loads and layout.

D. Install hanger wire as required with necessary on center spacing to support expected ceiling load requirements, following local practices, codes and regulations. Provide additional wires at light fixtures, grilles, and access doors where necessary. A pigtail knot shall be used with three tight wraps at top and bottom fastening locations.

E. Add additional wire as needed when using compatible clips and accessories.

F. Control Joints: Roll-formed zinc alloy, aluminum, or plastic as required for expansion and contraction as shown on drawings.

G. Expansion Joints: Roll-formed zinc alloy, aluminum, or plastic as required for expansion and contraction as shown on drawings.

H. Main beams shall be suspended from the overhead construction with hanger wire, spaced as required for expected ceiling loads, along the length of the main beams.

I. Install cross tees at on center spacing as specified by the drywall manufacturer. Typical drywall cross tee spacing:

1. 16 inches on center with 5/8 or 1/2 inch gypsum board

2. 24 inches on center with 5/8 inch gypsum board

J. Other items such as wood, sheet metal, or plastic panels should be screwed to comply with deflection limit equivalent to that of the ceiling installation.

K. Use channel molding or angle molding to interface with Drywall Grid System to provide

perimeter attachment or to obtain drop soffits, verticals, slopes, etc.

L. To suspend a second ceiling beneath a new or existing drywall ceiling, without breaching the integrity of the upper ceiling, use the Drywall Clip. To form a transition from a drywall ceiling to an acoustical ceiling, use the Drywall Transition Clips spaced as required for expected loads.

M. For light fixtures (Type G, Type F) use secondary framing cross tees as required to frame opening.

N. Single cross tees in a rout hole to be secured by 7/16 inch framing screw or alternative methods.

3.2 INSTALLATION - INTERIOR APPLICATIONS

A. Install main beams and cross tees at the on center spacing required for ceiling loading, and location of in-ceiling services.

B. Install additional bracing at 48” o.c or as indicated by delegated Engineer.

3.3 INSTALLATION - RADIUS APPLICATIONS

A. Determine the bow or camber (Convex or Concave) in a main runner.

B. Establish a jig or pattern on a flat surface, mark locations to cut main beam, and use four pan head screws to fasten a Radius Clip (RC2) flat to the web between the bulb and the flange per the manufacturer's instructions.

C. Install main beams with on center spacing and wire spacing, as needed, to support expected ceiling load.

D. Additional bracing at 48” O.C. or as indicated by delegated Engineer.

E. Install cross tees at on center spacing as specified by the manufacturer.

END OF SECTION 09 22 26

SECTION 09 24 23 - PORTLAND CEMENT PLASTER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General Provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification sections, apply to work of this section.

B. Section 04 22 00, “Concrete Unit Masonry”

C. Section 07 27 29, “Air Barrier Coatings”

D. Section 07 92 00, “Joint Sealants”

E. Section 09 96 53, “Elastomeric Coating”

1.2 DESCRIPTION OF WORK

A. Types of work include:

1. Metal furring and lathing.
2. Portland Cement plastering.
3. Expansion Joints.
4. Accent Joints.

B. Locations include: Buildings exterior.

C. Types

1. Stucco Fine Finish Smooth or as indicated on drawings.

1.3 QUALITY ASSURANCE

A. Portland Cement plastering standards, A.S.T.M. C-926-16a, Standard Specification for Application of Portland Cement Plaster.

B. Portland Cement Stucco Manual, Portland Cement Association, (EB049) Fifth Edition

C. ASTM C1063-19a, Standard Specification For Installation of Lathing and Furring To Receive Interior and Exterior Cement-Based Plastering.

D. Applicator with minimum of 5 years of successful documented experience. Submit samples and address of completed project in Florida.

1.4 SUBMITTALS

A. See Section 01 33 23 - Shop Drawings, Product Data, And Samples

1. (SD-01) Submit copies manufacturer's product specifications and installation instructions for each material, including other data as may be required to show compliance with these specifications.

2. (SD-17) Submit Samples of all accessories and materials

3. (SD-05)(SD-06) Proposed pre mix design, mixing and installation instructions

4. (SD-04) Submit shop drawings depict elevations and details for stucco installation.

1.5 PRODUCT HANDLING

A. Deliver, store and protect manufactured materials to comply with referenced standards.

1.6 JOB CONDITIONS

A. Comply with referenced standards for environmental conditions. Protect contiguous work from soiling, spattering, moisture deterioration and other harmful effects, which might result from plastering.

1.7 PRE-INSTALLATION MEETING.

A. Conduct a pre-installation meeting with manufacturer representative prior to the start of work.

1.8 SAMPLE PANEL

A. Construct (two) eight-foot square panel for each stucco finish type for approval by the Architect prior to installation of the finish. Construct panel showing ,head sill, sill and jamb at curtain wall. The second panel will show all accessories.

B. Construct a 3nd panel that show samples of joint construction corners, control joints, expansion joints and intersection without stucco. The sample will show attachment, cuts, fitting and method of caulking the joints on the back side. Call for inspection of method of installation.

PART 2 - PRODUCTS

2.1 METAL SUPPORT, FURRING, LATHING AND ACCESSORY MATERIALS

A. Metals and Finishes: Manufacturer's standard steel products, unless indicated as zinc alloy or other metal; where not otherwise indicated, provide manufacturer's standard galvanized finish on steel products except as follows:

1. Exterior/Interior Components: Hot-dip galvanized finish, A.S.T.M. A-525-G-90 for 18 gage and lighter formed metal products, A.S.T.M. A-123 galvanized after fabrication for 16 gage and heavier products.

2. Exterior/Interior Exposed Plastering Accessories: Provide zinc alloy accessories for exterior work and work in "high humidity" area.

3. Wire Ties: Galvanized soft steel wire, 8 gauge.

2.2 ACCESSORY MATERIALS DEPTH

A. Coordinate depth of accessory with thickness of number of coats of plaster to be applied.

1. 7/8" thick, three-coat system on metal lath.

2.3 SMALL NOSE CORNER BEADS

A. General-purpose type with expanded or perforated flanges.

2.4 CORNER TIE

A. Manufacturer's standard pre-formed interior corner reinforcement made from 2.5lbs. per sq. yd. galv. diamond mesh lath.

2.5 SQUARE EDGE CASING BEADS

A. Manufacturer's standard with expanded or short flange to suit application.

2.6 TWO-PIECE EXPANSION JOINTS

A. Manufacturer's standard galv. roll-formed pair of casing beads with modified back flanges providing positive slip joint action and dust barrier, adjustable for joint width variation of 1/8" to 5/8".

2.7 ONE-PIECE CONTROL JOINTS

A. Manufacturer's standard galv. roll-formed control joint with back flanges.

2.8 CORNER REINFORCEMENT

A. Special stucco-type woven galvanized wire corner reinforcing strips.

2.9 FASTENERS

A. Galvanized steel of type and length suitable for adequate penetration of the substrate.

2.10 PORTLAND CEMENT PLASTER MATERIALS

A. Provide either neat or ready-mixed (where applicable) materials, at installer's option, complying with A.N.S.I. A-42.2.

B. Base Coat Cement: Portland Cement, A.S.T.M. C-150, Type I or IA.

C. Base Coat Lime: Special finishing hydrated lime, Type S.

D. Base Coat Aggregate: Sand.

E. Finish Coat: Site prepare finish coat of texture indicated.

F. Texture: Fine Finish Smooth or as noted on the drawing.

2.11 BONDING MATERIALS

A. Bonding Additive: Acrylic-based emulsion for bonding exterior and interior Portland Cement plaster base-coat to solid substrates.

B. Products: Quick-Cure, Ad-Liquid (FINESTONE CORP.); Acrylic Admix-101 (LARSEN PRODUCTS CORP.); or Acryl-60 (STANDARD DRYWALL PRODUCTS).

2.12 PLASTER MIXES

A. Mix for Exterior Portland Cement Plaster. Include bonding additive in accordance with manufacturer’s instructions.

2.13 SEALANT

A. Install Elastomeric (Dow Corning) sealants in two piece expansion joints. At all joints and under joints

B. Install Elastomeric (Dow Corning) sealant at butt joints of all control and expansion joint edges.

C. Install Elastomeric (Dow Corning) sealants at all accessories intersection joints.

D. Install elastomeric sealants at all exposed edges of "J" end and edges.

E. And as shown on the drawings

2.14 LATH

A. 3.4 lbs./sq. yard sqf. furring, diamond mesh galvanized metal on 15lbs non perforated asphalt felt.

2.15 THE WIRE

A. 8 gauge galvanized wire.

2.16 WEATHERIZATION MEMBRANE

A. See Section 07 62 29 Water and Air Barrier Coating.

2.17 STUCCO HORIZONTAL, VERTICAL EXPANSION JOINT AND CONTROL JOINT , CORNER AND J BEADS.

A. As manufactured by “Amico” or approved substitution.
   1. Corner beads
   2. "J" Beads
   3. "W" Control Joint.
   4. Two Piece Expansion Joint

2.18 FOUNDATION SCREED

A. 631-78

2.19 OTHER MISCELLANEOUS ACCESSORIES

A. Other miscellaneous accessories as required by field conditions and drawings.
B. Install Contineous perimeter Sealant at all wall penetrants (Pipes, conduits, anchors) at waterproofing membrane and at stucco.

PART 3 - EXECUTION

3.1 PREPARATION

A. Plastering: Clean plaster bases and substrates to be plastered, removing loose materials, coatings and other substances, which might impair the work.

3.2 COORDINATION

A. Coordinate installation of plaster work with work performed under damproofing and water proofing sections.

3.3 INSTALLATION OF WEATHERIZATION MEMBRANE

A. Conduct pre-installation conference with manufacturer

B. Install per manufacturers written instructions and pre-installation conference instructions.

C. Install in direction and with lap as noted in installation instruction.

D. Repair all holes, nail punchers and rips in membrane using manufacturers' requirements and recommendations for area required for lap of edge of repair and adhesives.

E. Flash and install sealant cont around perimeter of penetrations.

3.4 INSTALLATION OF METAL SUPPORT SYSTEMS

A. Isolation: Where lathing and metal support system abuts building structure horizontally, and where partition wall work abuts overhead structure, isolate the work from structural movement sufficiently to prevent transfer of loading into the work from the building structure. Install slip or cushion type joints to absorb deflections but maintain lateral support.

B. Frame both sides of control and expansion joints independently, and do not bridge joints with furring and lathing or accessories.

C. Fixture Support Framing: Install supplementary framing, blocking and bracing where work is indicated to support fixtures, equipment, services, casework, heavy trim and furnishings and similar work requiring attachment and support.

3.5 METAL LATHING

A. Install metal lath to comply with referred standards and as indicated on drawings and specifications over waterproofing membrane.

3.6 PLASTER ACCESSORIES

A. Anchor each flange of accessories 8" o.c. to plaster base. Miter cope accessory corners and install with tight joints accurately aligned. Set accessories plumb, level and true to line with a tolerance of 1/8" in 10'-0". Install metal corner beads at external corners.

B. Install casing beads at terminations of plaster work, except where plaster is indicated to pass through other work and be concealed by lapping work, and except where special screens, bases or frames act as casing beads including interior metal door frames.

C. For exterior work, set casing beads 1/4" from abutting frames and other work (for application of sealant).

D. Install prefabricated expansion joints of 2-piece design where shown as "expansion joint".

E. Seal all intersection joints of accessories with Sealant , Dow Corning Silicone Sealant, continuous behind and at each intersection joint.

F. Cut Metal Lath on either side of Control/Expansion joint accessories,

G. Extend non perforated asphalt paper cont. under accessory, expansion/control joint.

3.7 INSTALLATION OF PLASTER

A. Mechanically mix plaster materials at the project site. Do not hand mix except where small amounts are needed, using less than one bag of plaster. Sequence plaster installation properly with the installation and protection of other work so that neither will be damaged by the installation of the other.

B. Plaster flush with metal frames and other built-in metal items or accessories, which act as a plaster ground, unless otherwise shown. Where plaster is not terminated at metal by casing beads, cut base coat free from metal before plaster sets and groove finish coat at the junctures with metal.

C. Apply thicknesses and number of coats of plaster as indicated, or as required by referenced standards. Provide 3-coats 7/8" total thickness plaster at metal lath installation.

D. Wet cure Portland Cement Plaster.

3.8 TEXTURE OF PLASTER FINISHES

A. Except as otherwise indicated, apply finish coat as follows:

1. Exterior Portland Cement Plaster: Fine Finish Smooth or as noted on drawings.

3.9 CUTTING AND PATCHING

A. Cut, patch, point-up and repair plaster as necessary to accommodate other work and to restore cracks, dents and imperfections. Repair or replace work to eliminate blisters, buckles, excessive crazing and check cracking, dry-outs, efflorescence, sweat-outs and similar defects, including areas of the work which do not comply with specified tolerances and where bond to the substrate has failed. Trowel finishes lightly to remove trowel marks and arises.

3.10 SEALANT INSTALLATION

A. Butter all butt joint and back of joints of accessories with sealant.
B. Install cont. bead of sealant round all penetrants going thru waterproofing building membrane and stucco.
C. Seal all open edges or stucco joints cont.

3.11 CURING

A. Maintain 80% Relative humidity for at least 24 hours after installation. Cure stucco with moisture.
B. Cure stucco for 30 days or PH level less than 7 (Neutral prior to installation of any finish.

3.12 CLEANING AND PROTECTION

A. Remove temporary protection and enclosure of other work. Promptly remove plaster from doorframes, windows, and other surfaces that are not to be plastered. Repair floors, walls, and other surfaces that have been stained, marred or otherwise damaged during the plastering work. When plastering work is completed, remove unused materials, containers and equipment and clean floors of plaster debris.

B. Installer shall advise the Contractor of requirements for the protection of plaster from deterioration and damage during the remainder of the construction period.

END OF SECTION 09 24 23

SECTION 09 30 00 - TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:
1. To the extent of requirements in drawing and specifications for:
   a. Porcelain Stone tile
   b. Glass Mosaic tile

1.2 REFERENCES

A. 2019 TCNA Handbook for Ceramic Stone, and Glass Tile Installation by the Tile Council of North America, Inc.

B. ANSI A 108 Series/A118 Series-American National Standards for Installation of Ceramic Tile

C. ANSI A 137.1- American National Standard Specifications for Ceramic Tile.

D. TTMAC-Tile Specification Guide 09 30 00 Tile Installation Manual.

E. ISO 13007- International Standards Organization; classification for Grout and Adhesives.

1.3 PERFORMANCE REQUIREMENTS

A. Static Coefficient of Friction on Walkway Surfaces: Provide the following values as determined by ASTM C 1028:

1. Flat Surfaces: Minimum 0.6
2. Step Treads: Minimum 0.6
3. Ramp Surfaces: Minimum 0.8

1.4 SUBMITTALS

A. (SD-01) Product Data:

1. Published data for each type of tile, mortar, grout, and product specified.
2. One current TCNA Handbook on Site for reference.
3. Maintenance instructions, including cleaning methods, chemical solutions, stain removal methods, polishes, and sealants recommended.

B. (SD-15) Samples:

1. Color samples showing the full range of colors, textures, and patterns for tiles selected on the drawing.

2. Color samples consisting of actual sections of grout (cured).

3. Construction of wall and floor mock up for review and acceptance by the Architect prior to installation. The designated mock up sample may become part of the installed work after review and acceptance. If mock up is not accepted it will be removed.

4. Sample of each accessory type.

1.5 QUALITY ASSURANCE

A. 2019 TCNA Handbook to be available on site at the request of the Architect.

B. Engage an experienced installer who has completed tile installations similar in material, design, and extent to that indicated for this Project.

C. Obtain each color, grade, finish, type, composition, and variety of tile from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use.

B. Prevent damage or contamination to materials by water, foreign matter, and other causes.

1.7 PROJECT CONDITIONS

A. Do not install tile until construction in spaces is completed and ambient temperature and humidity conditions are being maintained per manufacturer's written instructions.

B. Shade work areas from direct sunlight to prevent rapid evaporation caused by excessive heat.

1.8 RELATED SECTIONS

A. Section 06 10 00, “Rough Carpentry”
B. Section 06 60 16, “Solid Surfacing Fabrications”
C. Section 09 21 16, “Gypsum Board Assemblies”
D. Section 09 22 26, “Metal Suspension Systems”

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Crossville, 321-229-3252, Basis of design, no substitution

1. Tile types, size and finish as shown on the drawings Sheet AF712

B. Tile-Setting and Grouting Materials:

1. Floor: TCNA: F205a-130 Stone and MAPEI: 205/A

   Epoxy Grout: Kerapoxy CQ, ISO RG and ANSI A118.3 or better

   Bond Coat: "Ultrflex LFT", ISO C2TES1P1 and ANSI A118.4 or better

   Isolation/Waterproofing Membrane: "Mapelastic 400"

   Cementitious self-leveling underlayment: MAPEI "Utraplan Easy"

   Primer: MAPEI "Primer T"

   Patching and Skimcoat Compound: Planipatch

2. Walls: TCNA:W244F-13 and MAPEI MW244F

   Epoxy Grout: MAPEI, Kerapoxy CQ, ISO RG and ANSI A118.3 or better

   Bond Coat:MAPEI "Ultrflex LFT", ISO C2TES1P1 and ANSI A118.4 or better

C. Tile Accessories

1. Schluter-Systems

2.2 PRODUCTS, GENERAL

A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1, "Specifications for Ceramic Tile," for types, compositions, and other characteristics indicated.

B. Colors, Textures, and patterns: as noted on the drawings

1. Grout color: Mapei 27 Silver and or as selected by Architect from all available price groups.

2. Grout joint in wall shall align with floor joints except for the curved vestibule walls.

C. Factory Blending: For tile exhibiting color variations within ranges selected during Sample submittals, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

2.4 MISCELLANEOUS MATERIAL

A. Isolation/Waterproofing Membrane: Mapelastic 400 by Mapei

D. Expansion Joints

1. If not indicated on the Drawings, expansion joints shall be installed in accordance with the Tile Council of North America, Inc., Handbook for Ceramic Tile Installation, latest edition, as follows:

a. Interior: 20' to 25' in each direction. b. Exterior: 8' to 12' in each direction.

c. Interior tilework exposed to direct sunlight or moisture: 8' to 12' in each direction.

d. Where tilework abuts restraining surfaces such as perimeter walls, dissimilar floors, curbs, columns, pipes, ceilings, and where changes occur in backing materials.

e. All expansion, control, construction, and cold joints in the structure shall continue through the tilework including such joints at vertical surfaces.

f. Joints through tilework directly over structural joints shall never be narrower than the structural joint.

g. Joints at perimeter of each space where no field joints are detailed.

PART 3 - EXECUTION

3.1 INSPECTION

A. Prior to installing tile, inspect surfaces to receive tile. Do not proceed with installation until such defects or conditions have been corrected.

1. Verify walls have no efflorescence
2. Examine drains, and clamping devices to verify that they are in a condition ready to receive waterproofing membrane with no deficiency that could result in a potentially defective installation or leaks.
3. Verify floor meets L/360 minimum.
4. Verify wall substrate surfaces are a maximum of 1/8 inch in 10 feet, any direction.

B. All flattening must be completed prior to any cleavage membranes or waterproofing membranes are installed.

C. Do not install tile over waterproofing until waterproofing has cured and been tested to determine that it is watertight.

3.2 PREPARATION

A. Consult Architect to establish floor levels and floor recesses before setting any work. Maximum surface variation shall not exceed 1/4 inch in 10 feet, non-accumulative.

B. Clean rough concrete slab surface of drippings and other debris. Roughen surface if necessary. Wash thoroughly with clean water permitting concrete to become saturated. Slush with neat cement grout to insure good bond.

1. Neutralize any trace of strong acid or alkali (PH level 7 to 9).

C. When necessary because of unevenness or roughness of base, or to bring tile to proper flattness, install leveling coat and permit to set and harden, wet cure.

D. Provide tape reinforcement at joints including inside corners and outside corners.

3.3 LAYOUT

A. See Drawing – with proposed lay out assignments for floor to wall.

B. Determine locations of movement joints before starting tilework.

C. Locate cuts in both walls and floors in alighment.

D. Lay out tile wainscots to next full tile beyond dimensions shown.

F. Joints, See floor plans and elevations.

a. Align wall joints to give straight, uniform grout lines, plumb and level.
b. Align floor joints to give straight uniform grout lines parallel with walls.
c. Wall and floor joints to align except at curved walls.
d. No Bond Coat to be visible in finished installation.

G. Make joints between tile sheets same width as joints within sheets so extent of each sheet is not apparent in finished Work.

H. Porcelain tile can have large variances in sizing. Do not mix sizes and types of tiles in pattern areas. Joints that do not line up or joint widths that vary will be unacceptable.

1. Joint Width: 1/8 inch wide, unless otherwise recommended.

3.4 MIXING MORTARS AND GROUT

A. Proportion mixes in accordance with latest ANSI standard specifications.

B. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions using mixing equipment designed for optimum performance characteristics for installations indicated.

C. Add materials, potable water, and additives in accurate proportions according to manufacturer’s written instructions.

1. Liquid latex additive shall be added undulited.

3.5 SETTING METHODS

A. Comply with parts of ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" that apply to types of setting and grouting materials and to methods indicated in ceramic tile installation schedules.

B. Install floor tile, thresholds and base in accordance with Tile Council of North America recommendations.

C. All areas must have a cleavage membrane installed under 100 percent of tiled floor area, and beyond tile area to limits shown on drawing.

D. Concrete Subfloors

1. Slabs on Second Floor : TCNA F205A-130 Stone

E. Walls

1. High Impact Panel (Thin-Set Method): TCNA W244F-13

F. Sound each tile after set. Replace all tiles sounding hollow.

3.6 INSTALLATION, GENERAL

A. Perform cutting and drilling of tile without marring visible surfaces. Grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

1. Smooth exposed cut edges.
2. When using glazed tile sheets, minimize tearing sheets apart by drilling pipe holes as much as possible.

B. Extend tile work into recesses and under or behind equipment and fixtures. Terminate work at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Ensure tile joints are uniform in width, subject to normal variance in tolerance allowed in tile size. Ensure joints are watertight, without voids, cracks, excess mortar or grout.

D. Locate expansion, control, contraction, and isolation joints, during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Locate joints in tile surfaces directly above joints in concrete substrates.
2. Prepare joints and apply sealants to comply with requirements of Division 07 Section, Joint Protection.

E. Allow tile to set for a minimum of 48 hours prior to grouting. Follow manufacturer's directions if longer waiting period is required.

F. Curing:

1. Flattening Beds: Moist cure for 20 hours at minimum 70° F for dry-set mortar installations. Allow to dry before setting tile. Environmental conditions and manufacturer may require longer cure times.
2. Dry-set Mortar: Minimum 48 hours, longer depending on temperature, humidity, and manufacturer recommendations.

3. Dry-set Grout: Damp cure minimum 72 hours, longer depending on temperature, humidity, and manufacturer recommendations.

3.7 GROUTING

A. Install grouting in accordance with ISO RG and ANSI A118.3 and manufacturer's written instructions during application and cleaning.

B. Rinse tile work with clean water before and after using chemical cleaners as recommended by tile and grout manufacturer.

3.8 WATERPROOFING MEMBRANES

A. Install in accordance with manufacturer's written installation instructions.

B. Install waterproof membrane on flat over mortar to drains as required by the manufacturer's written installation instructions.

C. Upon completion of work, test for leaks by plugging the drain or damming areas and filling with water a minimum of 4 inches at curbs for a period of 24 hours. Inspect for leakage. Make necessary adjustments to stop all leakage and re-test until watertight, before mortar bed is installed.

3.9 CLEANING AND PROTECTING

A. Clean tile and grout as recommended by manufacturer. Remove all traces of grout.

B. Cover exposed hardware with a heavy coating of Vaseline to protect the metal from the possible effects of the acid or its fumes, when acid solutions are recommended by manufacturer to clean the face of finished tile work of surplus grouting or pointing mortar. Do not use acid solution for cleaning glazed tile.

C. Protect the tile against damage after installation. Damaged tile that appears in the finish work prior to the data of Substantial Completion is to be repaired or replaced. Protect adjoining areas and surfaces.

END OF SECTION 09 30 00

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SECTION 09 51 13 - ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General conditions provisions of the contract including contractual conditions, and Division 01 specifications.

1.2 SUMMARY

A. Work to the extent shown on the drawings and specifications.

B. Section Includes:

1. Acoustical ceiling panels.
2. Exposed grid suspension system.
3. Wire hangers, fasteners, main runners, cross tees, and wall angle moldings.

1.3 SUBMITTALS

A. (SD-01) Product Data: Submit manufacturer's technical data for each type of acoustical ceiling unit and suspension system required.

B. (SD-15) Samples: Minimum 6" x 6" samples of specified acoustical panel; 8"-long samples of exposed wall molding and suspension system, including main runner and 4' cross tees.

C. (SD-04) Shop Drawings: Layout and details of acoustical ceilings. Show locations of items, which are to be coordinated with or supported by the ceilings.

D. (SD-13) Certifications: Manufacturer's certifications that products comply with specified requirements, including laboratory reports showing compliance with specified tests and standards. For acoustical performance, each carton of material must carry an approved independent laboratory classification of NRC, CAC, and AC.

E. (SD-29) If the material supplied by the acoustical subcontractor does not have an Underwriter's Laboratory classification of acoustical performance on every carton, subcontractor shall be required to send material from every production run appearing on the job to an independent or NVLAP approved laboratory for testing, at the architect's or owner's discretion. All products not conforming to manufacturer's current published values must be removed, disposed of, and replaced with complying product at the expense of the Contractor performing the work.

F. (SD-05) Signed and Sealed Shop Drawings: Provide shop drawings with details and calculations that show the fastening of hanger cables to the underside of the structure. For each type of condition prepare signed and sealed documents by Florida Registered Engineer.

1.4 QUALITY ASSURANCE

A. Single-Source Responsibility: Provide acoustical panel units and grid components by a single manufacturer.

B. Fire Performance Characteristics: Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.

1. Surface Burning Characteristics: As follows, tested per ASTM E84 and complying with ASTM E1264 for Class A products.

a. Flame Spread: 25 0r less
b. Smoke Developed: 50 or less

C. Provide field pull testing on hanger wire and fasteners for field installed components in accordance with ASTM C 754 and testing protocol to be reviewed by the OAR.

1.5 PROJECT CONDITIONS

A. Space Enclosure:

1. All ceiling products and suspension systems must be installed and maintained in accordance with Armstrong written installation instructions for that product in effect at the time of installation and best industry practice. Prior to installation, the ceiling product must be kept clean and dry, in an environment that is between 32°F (0°C) and 120°F (49°C) and not subject to Abnormal Conditions. Abnormal conditions include exposure to chemical fumes, vibrations, moisture from conditions such as building leaks or condensation, excessive humidity, or excessive dirt or dust buildup.

2. HumiGuard Plus Ceilings: Installation of the products shall be carried out where the temperature is between 32°F (0°C) and 120°F (49°C). It is not necessary for the area to be enclosed or for HVAC systems to be functioning. All wet work (plastering, concrete, etc) must be complete and dry. The ceilings must be maintained to avoid excessive dirt or dust buildup that would provide a medium for microbial growth on ceiling panels. Microbial protection does not extend beyond the treated surface as received from the factory and does not protect other materials that contact the treated surface such as supported insulation materials.

1.6 WARRANTY

A. Acoustical Panel: Submit a written warranty executed by the manufacturer, agreeing to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to:

1. Acoustical Panels: Sagging and warping as a result of defects in materials or factory workmanship.
2. Acoustical Panels with BioBlock Plus or designated as inherently resistive to the growth of micro-organisms installed with Armstrong suspension systems:
3. Visible sag and will resist the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria, and
4. Grid System: Rusting and manufacturer's defects.

B. Warranty Period Humiguard:

1. Acoustical panels: Ten (10) years from date of substantial completion.
2. Grid: Ten (10) years from date of substantial completion.
3. Acoustical panels and grid systems with HumiGuard Plus or HumiGuard Max performance supplied by one source manufacturer is thirty (30) years from date of substantial completion.

C. The Warranty shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under the requirements of the Contract Documents.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Ceiling Panels: Armstrong World Industries, Inc. is the basis of design.

2.2 ACOUSTICAL CEILING UNITS

A. Acoustical Panels Types: As noted on drawings – AF712

1. Surface Texture: As noted on drawings
2. Composition: Mineral Fiber
3. Color: White
4. Size: As noted on drawings
5. Edge Profile: As noted on drawings for interface with Interlude XL 9/16" Dimensional Tee
6. Noise Reduction Coefficient (NRC): ASTM C423; Classified with UL label on product carton, As noted on drawings
7. Ceiling Attenuation Class (CAC): ASTM C1414; Classified with UL label on product

carton, as noted on drawings

8. Emissions Testing: Section 01350 Protocol, <13.5 ppb of formaldehyde when used under typical conditions required by ASHRAE Standard 62.1-2004, "Ventilation for Acceptable Indoor Air Quality"
9. Flame Spread: ASTM E1264; Class A (UL)
10. Light Reflectance (LR): ASTM E1477; White Panel: Light Reflectance: 0.90
11. Dimensional Stability: HumiGuard Plus - Temperature is between 32°F (0°C) and 120°F (49°C). It is not necessary for the area to be enclosed or for HVAC systems to be functioning. All wet work (plastering, concrete, etc.) must be complete and dry.
12. Antimicrobial Protection: BioBlock Plus - Resistance against the growth of mold/mildew and gram positive and gram negative odor and stain causing bacteria.
13. Acceptable Product: As noted on drawings as manufactured by Armstrong World Industries is basis of design or approved substitution.

2.3 SUSPENSION SYSTEMS

A. Components: All main beams and cross tees shall be commercial quality hot-dipped galvanized (galvanized steel, aluminum, or stainless steel) as per ASTM A653. Main beams and cross tees are double-web steel construction with type exposed flange design. Exposed surfaces chemically cleansed, capping pre-finished galvanized steel (aluminum or stainless steel) in baked polyester paint. Main beams and cross tees shall have rotary stitching (exception: extruded aluminum or stainless steel).

1. Structural Classification: ASTM C635 HD.
2. Color: White or as noted otherwise.
3. Acceptable Product: Interlude XL 9/16" Dimensional Tee as manufactured by Armstrong World Industries, Inc. basis of design or approved substation.

B. Attachment Devices: Size for five (5) times design load indicated in ASTM C635, Table 1, Direct Hung, unless otherwise indicated.

1. Wire for hangers and ties: ASTM A641, Class 1 zinc coating, soft temper, pre-stretched, with a yield stress load of at least three (3) times design load, but not less than 9 gauge.
2. Edge moldings and trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations, including light fixtures, that fit type of edge detail and suspension system indicated. Provide moldings with exposed flange of the same width as exposed runner.
3. Accessories: 12' hemmed angle molding and miscellaneous molding required and special edges.
4. Ceiling expansion joint: Construction Specialties, Inc. C/S FCF-200 or as shown on drawings.
5. Lay-in ceiling to wall expansion joint: FCFC-200 or as shown on drawings

PART 3 - EXECUTION

3.1 EXAMINATION

A. Do not proceed with installation until all wet work such as concrete, gypsum board, plastering and painting has been completed and thoroughly dried out, unless expressly permitted by manufacturer's printed recommendations

3.2 PREPARATION

A. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less than half width units at borders, and comply with reflected ceiling plans. Coordinate panel layout with mechanical and electrical fixtures.

3.3 INSTALLATION

A. Install suspension system and panels in accordance with the manufacturer's instructions, and in compliance with ASTM C 636 and with the authorities having jurisdiction.

B. Suspend main beam from overhead structure with hanger wires spaced 4’-0” on center along the length of the main runner. Install hanger wires plumb and straight.

C. Install wall moldings at intersection of suspended ceiling and vertical surfaces. Miter corners where wall moldings intersect or install corner caps.

D. Install knife edge at corners with mitered 45 degree corner joints.

E. For reveal edge panels: Cut and reveal or rabbet edges of ceiling panels at border areas and vertical surfaces. Paint exposed cut edges to match tile color.

F. Install acoustical panels in coordination with suspended system, with edges resting on flanges of main runner and cross tees. Cut and fit panels neatly against abutting surfaces.

G. Support edges by wall moldings. No Ceiling tiles are to be installed in the grid until all above ceiling work is complete and signed off / accepted by the OAR. For any exceptions, notify the OAR / PM in advance of installing ceiling tiles.

H. Install hanger wires to support grid at each corner of light fixtures, at each speaker, CCTV Camera and other ceiling mounted devices.

3.4 ADJUSTING AND CLEANING

A. Replace damaged and broken panels.

B. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch up of minor finish damage. Ceiling Touch-Up Paint, (Item #5760, 8oz. bottles) (Item #5761, quart size cans), "global white" latex paint should be used to hide minor scratches and nicks in the surface and to cover field tegularized edges that are exposed to view.

C. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage

END OF SECTION 09 51 13

SECTION 09 65 19 - LVT-RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Resilient Floor Tiles – Luxury Vinyl Tile (LVT)
2. Stair Riser & Tread
3. Static Dissipative VCT
4. Vinyl coved base

1.2 SUBMITTALS

A. (SD-01) Product Data: Manufacturer’s published data including maintenance data.

B. (SD-04) Submit shop drawings, seaming plan, coving details, and manufacturer’s technical data, installation and maintenance instructions (latest edition of Armstrong Flooring Guaranteed Installation systems manual, F-5061 for flooring and accessories.

C. (SD-15) Samples: Manufacturer's color charts consisting of actual tiles or sections of tiles showing full range of colors and patterns available for each type of floor and base indicated.

1. For resilient accessories, manufacturer's standard-size samples, but not less than 12 inches long, of each resilient accessory color and pattern specified.

D. (SD-12) Results from Calcium Chloride Test and RH Test.

E. (SD-14) Warranty: Warranty documents specified herein.

1.3 QUALITY ASSURANCE

A. Single-Source Responsibility: provide types of flooring and accessories supplied by one manufacturer, including leveling and patching compounds, and adhesives.

B. Contractor Qualifications:

1. Employ contractors skilled in the successful installation of the specified materials and accessories on similar projects for a minimum of five years.
2. Select an installer who is competent in the installation of Armstrong Commercial resilient solid vinyl tile flooring.
3. Engage installers certified as Armstrong Commercial Flooring Certified Installers.
4. Confirm selected installers with certification by requesting credentials.

C. Anhydrous Calcium Chloride Moisture Tests: Conduct moisture tests on concrete substrates where moisture sensitive flooring is scheduled, prior to flooring installation. Provide frequency of tests as recommended by flooring manufacturer. 50 percent of test locations must be in the center of the slab, away from edges or expansion joints.

1. Test concrete slabs in accordance with ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride to ensure emission of no more than 3 lbs of water/1000 sf of slab in 24-hour period.
2. When test cannot be conducted under temperature and humidity conditions that will prevail under normal conditions, provide and maintain the 75 Deg F (+/- 5 Deg F) temperature and 50 percent (+/- 10 percent) humidity for 48 hours prior to and during the test.

D. Relative Humidity (RH) Probe within an Insulated Hood: Conduct moisture tests on concrete substrates where moisture sensitive flooring is scheduled, prior to flooring installation. Conduct RH tests on concrete substrates where surface moisture is to be 70 percent or lower for sensitive flooring per manufacturer's requirements.

1. Test concrete in accordance with ASTM F2420 Standard Test Method for Determining Relative Humidity on the Surface of Concrete Floor Slabs Using Relative Humidity Probe Measurement and Insulated Hood. Secure insulated hood to floor and measure RH within the box. Condition floor slab for 48 hours prior to starting the test. Provide test results to each flooring supplier/installer for warranty implications.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to Site in original unopened containers each bearing names of product and manufacturer, project identification, and shipping and handling instructions.

B. Store materials in dry spaces protected from the weather. Maintain ambient temperatures between 50 and 90 degrees F.

C. Store materials on flat surfaces. Condition materials in spaces where they will be installed a minimum of 48 hours prior to installation.

1.5 PROJECT CONDITIONS

A. Maintain a minimum temperature of 65 degrees F in spaces to receive tiles for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. After this period, maintain a temperature of not less than 55 degrees F.

B. Do not install materials until they have been conditioned to the space where they are to be installed.

C. Close spaces to traffic during tile installation.

1.6 SEQUENCING AND SCHEDULING

A. Install tiles and accessories after other finishing operations, including painting, have been completed.

B. Do not begin installation until concrete slabs have cured, dry, and able to bond with adhesive as determined by manufacturer.

1.7 WARRANTY

A. Manufacturer's Warranty: Standard warranty covering manufacturing defects and installation integrity: Installation integrity is defined as products installed in accordance with the manufacturer's installation manual.

1. Flooring: SDT Five years minimum
2. Base: One year minimum

B. Installer's Warranty: Guarantee flooring and base installation against defects in installation, workmanship and loss of adhesion for one year.

C. Warranty period begins on the Date of Substantial Completion.

1.8 LIMITED WARRANTY

A. LVT Resilient Flooring: Submit a written warranty executed by the manufacturer, agreeing to repair or replace resilient flooring that fails within the warranty period.

B. Limited Warranty Period: 20 years for Natural Creations with Diamond 10 Technology. Plus an additional 10 years with use of the Strong System for sub-floor preparation.

C. The Limited Warranty shall not deprive the Owner of other rights the Owner may have under other provision of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under re requirements of the Contract Documents.

D. For the Limited Warranty to be valid, this product is required to be installed using the appropriate Armstrong Flooring Guaranteed Installation system. Product installed not using the specific instruction from the Guaranteed Installation System will void the warranty.

PART 2 - PRODUCTS

2.1 LUXURY VINYL TILE FLOORING

A. Luxury Vinyl Tile a layered construction with vinyl wear layer over solid vinyl backing. Protected by a diamond-infused UV-cured polyurethane finish. Overall thickness is 3.2 mm. Luxury Vinyl Tile as noted on the drawings. No substitution

B. Reference specification – ASTM F 1700, Class III, Type B – Embossed Surface. Product Line and Manufacturer: LVT Product Contact: T.J. Thompson, Cain & Bultman (407) 209-8252, tthompson@cain-bultman.com.

C. Product Characteristics: No Substitutions.

a. Size; as noted on drawings.

b. Samples to be reviewed by Architect.

c. Owner selected color/pattern: As noted on the drawings, No substitution
d. Size: As noted on the drawings. No substitution
e. Hardness: ASTM D 2240: > 85 Shore A.

f. Slip Resistance: ASTM D 2047: COF > 0.5
g. Fire Resistance: ASTM E 648/NFPA 253: Class 1
h. Static Load Limit: 250 lbs./sq.in. (17.6 kg/cm2) ASTM F 970
i. Scratch Resistance Level: on the Mohs Scale of Hardness: Absolute Hardness of greater than 1200.

D. The Qualified / Certified Installers with local availability as follows:
1. Hudson Everly – contact: Kyle Everly keverly@hudsoneverly.com
2. Spectra – contact: Gregg Nelsen Gregg.nelsen@spectracf.com
3. Acousti – contact: Josh Rodgers joshrodgers@acousti.com
4. Other approved and certified installer of product by manufacturer.

E. Edge Transition Strips: Stainless Steel Schluter-Schiene transition strip a shown on drawings.

2.2 Static Dissipative VCT Tile

A. Basis of Design is Armstrong Static Dissipative Tile (SDT™)

B. The following additional manufacturers will also be acceptable

1. Tarkett
2. Mannington
3. Vinylasa Commercial

C. VCT tile size to be 1/8" in thickness and 12'x12' in size.

D. S-202 Static Dissipative Tile Adhesive Required

E. Electrical properties minimum criteria;

1. Resistance ANSI/ESD S7.1 ASTM F-150 Point to point and point to ground: 106 to 109 ohms
2. Resistance in Combination with a Person ANSI/ESD STM 97.1 At 12% R.H. with Dissipative footwear: 106 to 109 ohms
3. Static Generation ANSI/ESD STM 97.2 At 40% R.H. with Dissipative footwear: < 10 volts
4. At 12% R.H. with Dissipative footwear: < 10 volts
5. Static Dissipation ETS Dissipation At 12% R.H. with Dissipative footwear: 1000 to 100 volts: 0.2 seconds avg.
6. Color: As noted on the drawings.

2.3 RESILIENT BASE

A. Vinyl Cove Base: Vinyl, complying with FS SS-W-40, Type II, 4 inches in height by roll stock and 1/8-inch thick, ribbed back, rounded top, and set on type. (4 foot length base material is not acceptable.)

1. Provide molded corners 4 inches in height by 4 inches in length each way for internal and external corners.

2. Type: Standard toe (cove) at hard floor finishes, straight at carpet, unless otherwise indicated.
3. Color: As shown on the drawings.

2.4 ACCESSORIES

A. Stairs

1. Armstrong rubber square pattern tread. See drawings.

2. Armstrong rubber riser cut to fit. See drawings.

2.5 MISCELLANEOUS MATERIALS

A. Adhesive: Provide as recommended by manufacturer, Armstrong two-part epoxy.

B. For patching, smoothing and leveling monolithic subfloor (concrete) provide Armstrong fast-setting self-leveling underlayment as recommended by manufacturer.

C. Provide transition Schluder-Schiene S.S. strips. See drawings.

D. Provide threshold of thickness and width as shown on the drawings.

E. Provide stainless steel metal edge strips of width shown on the drawings and of required thickness to protect exposed edges of the flooring. Provide units of maximum available length to minimize the number of joints. Use stainless steel metal edge strips, Schluter, transition strips.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify substrate conditions are acceptable for product installation in accordance with manufacturer's instructions. Examine areas where installation of tiles will occur.

B. Concrete Subfloors: Verify concrete slabs comply with ASTM F 710 and the following:

1. Dry and free of curing compounds, sealers, hardeners, and other materials whose presence would interfere with bonding of adhesive. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by tile manufacturer.
2. Finishes of subfloors comply with tolerances and other requirements specified in Division 03 Section, Cast-In-Place Concrete for slabs receiving resilient flooring.
3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits of any kind.
4. Report conditions contrary to contract requirements that would prevent a proper installation. Do not proceed until unsatisfactory conditions have been corrected.
5. Failure to call attention to defects or imperfections will be construed as acceptance and approval of the subfloor. Installation indicates acceptance of substrates about conditions existing at the time of installation.

3.2 PREPARATION

A. Comply with manufacturer's installation specifications to prepare substrates to receive tile.

B. For subfloor preparation: smooth concrete surfaces, removing rough areas, projections, ridges, and bumps, and filling low spots, control or construction joints, and other defects with manufacturer recommended Armstrong fast-setting cement-based patch and underlayment.

C. For subfloor cleaning: the surface shall be free of dust, solvents, varnish, paint, wax, oil, grease, sealers, release agents, curing compounds, residual adhesive, adhesive removers and other foreign materials that might affect the adhesion of resilient flooring to the concrete of cause a discoloration of the flooring from below. Remove curing and hardening compounds not compatible with the adhesives used, as indicated by a bond test or by the compound manufacturer’s recommendations for flooring. Avoid organic solvents. Spray paints, permanent markers and other indelible ink markers must not be used to write on the back of the flooring material or used to mark the concrete slab as they could bleed through, telegraphing up to the surface and permanently staining the flooring material. If these contaminants are present on the substrate they must be mechanically removed prior to the installation of the flooring.

D. Broom and vacuum substrates immediately before tile installation. Following cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust.

3.3 INSTALLATION

A. Comply with tile manufacturer's installation directions and other requirements indicated applicable to each type of tile installation scheduled. Install LVT in strict accordance with the latest edition of Armstrong Flooring Guaranteed Installation systems manual, F-5061.

B. Lay out tile from center marks established with principal walls so tiles at opposite edges of room are of equal width. Adjust to avoid using widths less than half of a tile. Install tiles square with room axis, unless otherwise indicated.

1. Install LVT vinyl tiles as shown on drawings.

C. Match tiles for color and pattern by selecting tiles from cartons in same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles.

1. Lay tiles in pattern with respect to location of colors, patterns, and sizes as indicated on Drawings.

D. Scribe, cut, and fit tiles to butt tightly to vertical surfaces, permanent fixtures, built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosing.

E. Extend tiles into toe spaces, door reveals, closets, and similar openings.

F. Maintain reference markers, holes, or openings that are in place or plainly marked for future cutting by repeating on finish flooring as marked on subfloor. Use chalk or other nonpermanent marking device.

G. Install tiles on covers for telephone and electrical ducts, and similar items occurring within finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on these covers.

H. Set tile to substrates without producing open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, or other surface imperfections in completed tile installation.

I. Roll with a 100-pound (45.36 kilogram) roller in the field areas. Refer to specific rolling instructions of the flooring manufacturer.

J. Install flooring with adhesives, tools, and procedures in strict accordance with the manufacturer’s written instructions. Observe the recommended adhesive trowel notching, open times, and working times.

K. Coordinate depth of transition strip required with field condition for depth encounter and required for transition between finish floor materials and depth of leveling material.

3.4 RESILIENT WALL BASE INSTALLATION

A. Apply wall base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required. See drawings.

B. Install wall base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

C. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

D. Do not stretch wall base during installation.

E. On masonry surfaces or other similar irregular substrates, fill voids along top edge of wall base with manufacturer's recommended adhesive filler material.

F. Premolded Corners: Install premolded corners before installing straight pieces.

G. Apply butt-type metal edge strips where shown on the drawings before flooring installation. Secure units to the substrate, complying with the edge strip manufacturer’s recommendations.

3.5 INSTALLING RISERS AND TREADS

A. Install risers and treads per manufactures recommendations. Risers and Treads will have uniform glue over the entire surface in contact to the structural surface. No voids, bubbles or blisters are acceptable. Continues adhesion along the edges.

3.6 CLEANING AND PROTECTION

A. Perform the following operations immediately after completing tile installation:

1. Allow adhesive to dry for 48 hours after installation.
2. Remove visible adhesive and other surface blemishes using cleaner recommended by tile manufacturers.

3. Sweep or vacuum floor thoroughly.
4. Do not wash floor until after time period recommended by resilient floor tile manufacturer.
5. Damp-mop tile to remove black marks and soil.
6. Tiles with debris trapped underneath, shall be removed and replaced, prior to cleaning.
7. Perform initial and on-going maintenance according to the latest edition of Armstrong Flooring Maintenance Recommendations and Procedures manual, F-8663.

B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period. Use protection methods indicated or recommended by tile manufacturer.

1. Cover tiles with undyed, untreated building paper until inspection for Substantial Completion.
2. Do not move heavy and sharp objects directly over tiles. Place plywood sheets over tiles and under objects while they are being moved. Slide or roll objects over panels without moving panels.

C. Clean tiles, base, tread and riser not more than 4 days prior to dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean tiles using method recommended by manufacturer.

END OF SECTION 09 65 19

SECTION 09 70 00 - EPOXY FLOOR COATING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division -1 Specification sections, apply to the work of this section.

1.2 DESCRIPTION OF WORK:

A. To the extent shown on drawings and specified herein, Epoxy flooring and curbs.

B. This work includes the application of special coating systems to items and surfaces as scheduled including surface preparation, waterproofing coats, prime coats, and topcoats.

1. Special coating systems are defined as those types of materials and methods of application requiring more than normal skills and techniques for mixing handling and application.

C. Coat surfaces scheduled for special coating systems whether or not colors are designated, except where specifically noted as a surface not to be coated.

E. Floors, equipment curbs, floor opening curbs, alcove curbs and door sill curbs.

1.3 QUALITY ASSURANCE:

A. Single-Source Responsibility: Provide primers and other undercoat material produced by the same manufacturer as the finish coats. Use only thinners recommended by the manufacturer and only within recommended limits.

B. Coordination of Work: Review other sections of these specifications in which prime paints are to be provided to ensure compatibility of the total coatings systems for various substrates. Upon request, furnish information on the characteristics of specified finish materials, to ensure that compatible prime coats are used. Notify Architect of any anticipated problems using coating systems as specified.

1.4 SUBMITTALS: (SD-01, 02, 03, 14 & SD-16)

A. Product Data: Submit one (1) electronic copy to the Architect for review and approval in PDF format. Include manufacturer’s technical information including basic materials analysis and application instructions for each coating material specified. List each material and cross-reference to the specific coating and finish system and application. Identify by manufacturer’s catalog number and general classification. Provide specific physical color samples that are readily available.

B. Samples: Submit samples for the Architect's review of color and texture only. Provide a listing of material and application for each coat of each finish samples. Provide six (3) 4" square samples for each type of color and finish; define prime and finish coats.

1.5 DELIVERY, STORAGE, AND HANDLING:

A. Deliver materials to the job site in the manufacturer's original, new, unopened packages and containers bearing manufacturer's name and label and the following information:

Name or title of material.
Federal Specification number, if applicable.
Manufacturer's stock number and date of manufacture.
Manufacturer's name.
Contents by volume, for major pigment and vehicle constituents.
Thinning instructions.
Application instructions.
Color name and number.
Handling instructions and precautions.

B. Take precautions to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of special coatings.

C. Store materials not in actual use in tightly-covered containers. Maintain containers used in storage of coatings in a clean condition, free of foreign materials and residue. Protect from freezing where necessary. Keep storage area neat and orderly. Remove oily rags and waste daily. Take all necessary precautionary measures to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of stains.

1.6 JOB CONDITIONS:

A. Install work only when the manufactures recommendations of installation for temperature, humidity and cleanliness is met and confirmed.

B. Do not apply exterior coatings in rain, fog or mist, or when the relative humidity exceeds 85%, or to damp or wet surfaces, unless otherwise permitted by manufacturer's printed instructions.

C. Coating work may continue during inclement weather only if areas and surfaces to be coated are enclosed and the temperature within the area can be maintained within limits specified by the manufacturer during application and drying periods.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products to match existing floor as manufactured by "Stonhard", Inc. 800-257-7953.

1. Stongard MR- 1mm thick

a. Waterproofing Membrane Stonproof ME7
b. Finish Coat Stonkote GS4
c. Primer Standard Primer and SL Primer

2. Dur-A-Flex Inc.

3. Sika Corp., Industrial Flooring, 201 Polito Avenue,
Lyndhurst, NJ 07071
Phone 201.933.8800
Fax 201.933.6225
www.sikafloorusa.com

B. Texture and color per schedules on drawings.

2.2 INSPECTION

A. Material Quality: Provide best quality grade of various types of coatings as regularly manufactured by acceptable coating materials manufacturers. Use only materials displaying manufacturer's identification as a standard, best-grade product. Federal Specifications establish minimum acceptable quality for paint materials, except where other product identification used. Provide a written certification from coating manufacturer that materials provided meet or exceed these criteria.

B. Color Pigments: Pure, non-fading, applicable types to suite substrates and service indicated.

PART 3 - EXECUTION

3.1 INSPECTION:

A. Starting of coating work will be construed as the Applicator's acceptance of surfaces within any particular area.

B. Do not apply coating over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable coating film.

3.2 SURFACE PREPARATION:

A. General: Perform preparation and cleaning procedures in compliance with coating manufacturer's instructions for particular substrate conditions, and as herein specified.

1. Provide barrier coats over incompatible primers or remove and reprime as required. Notify Architect in writing of any anticipated problems in using the specified coating systems with substrates primed by others.
2. Remove hardware, hardware accessories, machined surfaces, plates, lighting fixtures, and similar items which are not to be coated, or provide surface-applied protection prior to surface preparation and coating operations. Remove, if necessary, for complete coating of items and adjacent surfaces. Following coating completion in each space or area, reinstall removed items, using workman skilled in trades involved.

B. Cementitious Surfaces: Prepare cementitious surfaces of concrete, concrete masonry, cement plaster and similar surfaces scheduled to receive special coatings by removing efflorescence, chalk, dust, dirt, grease, oils, and by roughing if required to remove glaze.

1. Determine alkalinity and moisture content of surfaces to be coated by performing appropriate tests. Do not apply coatings over surfaces where moisture content exceeds that permitted in manufacturer’s printed directions.
2. Mechanically prepare all surfaces to receive coating with a "Blastric Machine" removing all surface laitance, oil, grease, and dirt from surface and provide a mechanical profile for surface bonding.

3.3 MATERIAL PREPARATION:

A. General: Carefully mix and prepare materials in compliance with the coating manufacturer’s directions.

1. Do not mix coating materials produced by different manufacturers.
2. Maintain containers used in mixing and application in a clean condition, free of foreign materials and residue.
3. Stir materials before application to produce a mixture of uniform density, and as required during application. Do not stir film, which may form on surfaces, into the material. Remove film and, if necessary, strain the coating material before using.

3.4 APPLICATION

A. General: Apply special coatings by trowel, brush, roller, spray, squeegee, or other applicators in accordance with the manufacturer’s directions. Use brushes best suited for the type of material being applied.

B. Minimum Coating Thickness: Apply each material at not thinner than the manufacturer’s recommended spreading rate. Provide a total dry film or material thickness of the entire coating system as recommended by the manufacturer.

E. Completed Work: Match approved samples for color, texture and coverage. Remove, refinish or recoat work not in compliance with specified requirements.

3.5 CLEAN-UP AND PROTECTION

A. Clean-Up: During progress of work, remove from project site discarded materials, rubbish, cans and rags resulting from work. Upon completion of the work, clean all coating-spattered surfaces. Remove spattered coatings by washing, scraping or other proper methods, using care not to scratch or otherwise damage adjacent finished surfaces.

B. Protection: Protect work of other trades, whether to be coated or not, against damage. Correct damage by cleaning, repairing or replacing, and recoating as acceptable to the Architect. Leave the work in an undamaged condition.

C. Provide “Wet Paint” signs as required to protect newly-coated finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of coating operations.

END OF SECTION 09 70 00

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SECTION 09 81 00 - ACOUSTICAL INSULATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide mineral fiber batt type, unfaced acoustical insulation as specified and indicated on drawings.

B. Install above ceiling and in stud walls as scheduled.

1.2 RELATED SECTIONS

A. Section 09 21 16, “GYPSUM BOARD ASSEMBLIES”

B. Section 09 22 26, “METAL SUSPENSION SYSTEMS”

C. Section 09 51 13, “ACOUSTICAL PANEL CEILINGS”

1.3 REFERENCES

A. ASTM INTERNATIONAL (ASTM)

1. ASTM C 423 – Sound Absorbtion and Sound Absorption Coefficient by the Reverberating Room Method.

2. ASTM C 553 – Specification for Mineral Fiber Blanket and Felt Insulation (Industrial Type).

3. ASTM C 612 – Specification for Mineral Fiber Block and Board Thermal Insulation.

4. ASTM C 665 – Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing.

5. ASTM C 1104 – Test Method for Determining the Water Vapor Sorption of Unfaced Mineral Fiber Insulation.

6. ASTM E 84 – Test Method for Surface Burning Characteristics of Building Materials.

7. ASTM E 119 – Test Methods for Fire Tests of Building Construction and Materials.

8. ASTM E 136 – Test Method for Behavior of Materials in a Vertical Tube Furnace at 750C.

B. NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

1. NFPA 101 LIFE SAFETY CODE.

1.4 QUALITY ASSURANCE

A. Fire Resistance Ratings: Materials identical to those which have been determined by ASTM test indicated to comply with the fire-resistance and flammability ratings as tested by independent testing and inspecting organization acceptable to authorities having jurisdiction required by governing code and regulations.

B. Thermal Resistance: R-Values specified are for thermal resistance R-Value at 75°F.

C. Insulation shall provide a minimum STC Value of 51, ASTM C 423, when 3-inch thickness is placed inside a 3-1/2-inches metal stud wall with 5/8-inch thick gypsum board installed on both sides.

D. Obtain acoustical insulation through one source from a single manufacturer.

1.5 SUBMITTALS

A. (SD-01) Manufacturer's Product Data: Submit for each type of insulation, including installation instructions.

1.6 PRODUCT HANDLING

A. Protection: Keep insulation materials dry. Comply with manufacturer's recommendations for handling storage and protection.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. IIG MinWool-1200; Batt Sound Attenuation Fire Batts.

B. Johns Manville: Minwool Sound Attenuation Fire Batts (SAFB)

C. Roxul, Inc.; Acoustical Fire Batt (AFB).

D. Thermafiber, Inc.; Sound Attenuation Fire Blankets (SAFB).

2.2 MINERAL FIBER BATT INSULATION

A. ASTM C 665, Class A, Type I, unfaced, with a flame spread of 5 and smoke developed of 0; ASTM E 84.

B. NFPA 101: Class A rated interior finish.

C. ASTM E 136, rated non-combustible per NFPA Standard 220 less than 1% by volume.

D. ASTM C 1004, Fungi and Bacterial Resistance: Does not promote; absorbs.

E. R per inch thickness: 3.7.

F. Density: 2.5 lbs./cu.ft. minimum.

G. Size: 16-inches and 24-inches x 48-inches, or as required by stud spacing.

H. Thickness:

1. Ceiling: Minimum 3-inches and as scheduled.
2. Walls: Minimum 3-1/2-inches and as scheduled.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Manufacturer's Instructions: Comply with manufacturer's instructions.

B. Wall Installation: extend insulation full thickness over entire area as specified or indicated on drawings. Cut and fit tightly around obstructions, and fill voids with insulation. Butt ends and sides of blankets closely together.

1. Provide batt insulation in single layer of required thickness.

C. Ceiling Overlayment Application: Install single layer of insulation over entire ceiling in rooms scheduled. Tightly fit around the grillage, hangers and other vertical penetrations. Fit tightly around light fixtures.

END OF SECTION 09 81 00

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SECTION 09 91 00 - PAINTING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide painting work as specified and when shown on the drawings. The word paint means to apply paint materials and refers to the paint materials specified including primers, undercoats, sealers, fillers, stains and the finish coats of paint material.

B. Shop priming and primer touch-up miscellaneous steel items is specified in other sections.

C. The work includes painting of interior and exterior unfinished and primed items and surfaces throughout the project, unless otherwise specified or shown on drawings. Where items and surfaces are not specifically identified but are not specifically excluded from the painting work, paint the same as specified for adjacent similar surfaces and items.

D. Colors will be selected by Architect and or as shown on drawings.

E. Coordinate painting with all other sections for surfaces and items specified to be shop primed and for items to be factory and shop finished.

1.2 SURFACES NOT TO BE PAINTED

A. Surface preparation and priming of items and surfaces specified in other sections to be factory or shop primed.

B. Surfaces and items specified in other sections to be factory or shop finished.

C. Concealed wall and ceiling surfaces and inaccessible surfaces such as in pipe and duct chases and shafts, elevator shafts and similar areas.

D. Galvanized steel surfaces that will be concealed in completed work.

E. Fire rating labels, equipment labels and name plates.

1.3 REFERENCE STANDARDS

A. Master Painters Institute (MPI)

1. MPI 3.0 Painting Standards.

1.4 SUBMITTALS

A. (SD-01) Manufacturer's Product Data: Submit for each product. Include block fillers

and primers.

1. General: Include manufacturer's identification numbers, major pigment and vehicle constituents by volume, surface preparation, mixing, thinning, application and curing instructions.

2. Material List: Submit an inclusive list required coating materials. Submit list of manufacturer's brand name and number of each material proposed for use. Identify surface(s) to receive material.

3. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).

B. (SD-15) Samples: Submit for each material and color to be applied, with texture to simulate actual conditions, on representative samples of the actual substrate. After initial color selection from samples submitted. Paint 4' x 4' wall area on site for final approval by VPS.

C. (SD-08) Qualifications: Applicators shall submit data to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names of architects and owners, and other information that may substantiate experience.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: Applicator shall have completed painting system applications similar in material and extent to that indicated for this project with a record of successful in-service performance.

B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

1.6 MPI STANDARDS

A. Products: Complying with MPI standards indicated and listed in "MPI Approved Products List."

B. Preparation and Workmanship: Comply with requirements in "MPI Architectural Painting Specification Manual" for products and paint systems indicated.

1.7 MOCKUPS

A. Apply benchmark samples of each paint system indicated and each color and finish selected to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.

   a. Wall and Ceiling Surfaces: Provide samples of at least 100 sq. ft.

   b. Other Items: Architect will designate items or areas required.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver all materials to the project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label and the following information:

1. Product or material name.

2. Product description (generic classification or binder type).

3. Contents by volume, for pigment and vehicle constituents.

4. Thinning and application instructions.

5. Volatile organic compound (VOC) content.

1.9 JOB CONDITIONS

A. Paint Application:

1. Apply water-based paints only when temperature of surfaces to be painted are between 50ºF and 90ºF.

2. Apply solvent thinned paints only when the temperature of surfaces to be painted are between 45ºF and 95ºF.

B. Do not apply paint in rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5ºF above the dew point; or to damp or wet surfaces.

C. Paint Coordination: Review other sections in which primer paints are specified to ensure chemical compatibility with finish coating system. Furnish finish products which are compatible with primer products, or apply barrier coats over incompatible primers or remove and reprime.

D. Protection: Remove or otherwise protect hardware, lighting fixtures, sprinkler heads, electric device plates, HVAC grilles and registers and similar items in place prior to painting and re-position upon completion of operations. Protect floors, ceilings, curtain walls, equipment and other adjacent work by use of clean drop cloths or similar coverings. Protect the work of other trades from damage. Post signs on freshly painted surfaces immediately following their completion.

1.10 PREINSTALLATION CONFERENCE

A. Conduct a preinstallation conference prior to the commencement of exterior paint to review materials, installation procedures and schedules.

1. Conference shall be attended by the installer, manufacturer's representative, Architect, Owner, General Contractor and any subcontractor who will interface with the painting.

1.11 WARRANTY

A. Manufacturer shall provide a five (5) year warranty against facing and loss of adhesion.

B. Installer shall provide a two (2) year warranty for all exterior painting.

PART 2 - PRODUCTS

2.1 GENERAL

A. Paint systems, primers, sealer, fillers and finish paint shall be by one manufacturer for each type surface. Products shall be factory ready mixed for immediate application without thinning or other modification.

2.2 ACCEPTABLE MANUFACTURERS

A. Products of Sherwin-Williams Company are listed in the Product Schedule to illustrate paint material quality and type. Equivalent products of the listed acceptable manufacturers are also acceptable.

B. First grade products of the following manufacturers are acceptable, subject to submittal and approval of a schedule of products listing the surfaces for which they are intended.

1. Benjamin Moore & Company.

2. ICI Paints. (Formerly Devoe & Raynolds Company and Glidden Paint)

3. PPG Industries, Inc.

4. Pratt & Lambert Company.

2.3 PRODUCT SCHEDULE

EXTERIOR SCHEDULE

A. Metal (Steel, Ferrous Metal – Doors & Frames)

1. Alkyd Systems

a. Semi-Gloss Finish (MPI 48)

(1) 1st Coat: S-W Kem Kromik Universal Metal Primer, B50 Series (5-10 mils wet, 2-4 mils dry).

(2) 2nd Coat: S-W Industrial Urethane Alkyd Enamel Semi-Gloss, B54-150 Series.

(3) 3rd Coat: S-W Industrial Urethane Alkyd Enamel Semi-Gloss, B54-150 Series (5.2 mils wet, 3.0 mils dry per coat).

B. Aluminum

1. Acrylic System (MPI 114)

a. Semi-Gloss

(1) 1st Coat: Pro Industrial Pro Cryl Universal Acrylic Primer, B66W00310

(2) 2nd Coat: Pro Industrial High Performance Acrylic, B66W00651

(3) 3rd Coat: Pro Industrial High Performance Acrylic, B66W00651

INTERIOR SCHEDULE

A. Drywall (Walls, Ceilings, Gypsum Board, etc.)

1. Latex Systems

a. Egg Shell/Satin Finish (MPI 50).
Low Odor – Zero VOC Finish.

(1) 1st Coat: S-W ProGreen 200 Interior Latex Primer, B28W600 Series (4 mils wet, 1.5 mils dry).

(2) 2nd Coat: S-W ProMar 200 Zero VOC Latex Egg Shell, B20-2600 Series.

(2) 3rd Coat: S-W ProMar 200 Zero VOC Latex Egg Shell, B20-2600 Series (4 mils wet, 1.6 mils dry per coat).

b. Semi-Gloss Finish (Wet areas – bathrooms, etc.) Low Odor – Zero VOC Finish (MPI 50).

(1) 1st Coat: S-W ProGreen 200 Interior Latex Primer, B28W600 Series (4 mils wet, 1.5 mils dry).

(2) 2nd Coat: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series.

(3) 3rd Coat: S-W ProMar 200 Zero VOC Latex Semi-Gloss, B31-2600 Series (4 mils wet, 1.7 mils dry per coat).

B. Wood (Doors)

1. Alkyd Systems

a. Semi-Gloss Finish (MPI 43)

(1) 1st Coat: S-W Premium Wall & Wood Primer, B28W8111 (4 mils wet, 1.8 mils dry).

(2) 2nd Coat: S-W ProMar 200 Interior Zero VOC Latex Semi-Gloss, B31WQ2651 Series.

(3) 3rd Coat: S-W ProMar 200 Interior Zero VOC Latex Semi-Gloss, B31WQ2651 Series (4 mils wet, 1.5 mils dry per coat).

C. Metal (Steel, Ferrous Metal – Hollow Metal Doors and Frames)

1. Latex Systems (MPI 141)

1. Semi-Gloss Finish:

(1) 1st Coat: S-W Kem Kromik Universal Metal Primer, B50 Series (5-10 mils wet, 2-4 mils dry).

(2) 2nd Coat: S-W Pro Industrial Acrylic Semi-Gloss coating, B66W00651 Series.

(3) 3rd Coat: S-W Pro Industrial Acrylic Semi-Gloss coating, B66W00651 Series (4 mils wet, 1.5 mils dry per coat).

D. Drywall

1. Interior-Latex (MPI 139)

a. Egg Shell

(1) 1st Coat: ProMar 200 Zero VOC Interior Latex Primer, B28W02600

(2) 2nd Coat: Eminence HP Interior latex Low-Lustre, D17WQ8851

(3) 3rd Coat: Eminence HP Interior latex Low-Lustre, D17WQ8851

E. Stairwell Railings

1. Pre-catalyzed Waterbased Epoxy (MPI 141)

a. Semi-Gloss Finish

(1) 1st Coat: S-W Pro Industrial Pro-Cryl Industrial Primer, B66-310 Series.

(2) 2nd Coat: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy K46-151 Series

(3) 3rd Coat: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy K46-151 Series

F. Concrete Masonry Units

1. Pre-Catalyzed Waterbased Epoxy (MPI 153)

a. Semi-Gloss Finish

(4) 1st Coat: S-W Heavy Duty Block Filler

(5) 2nd Coat: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy K46WOO151 Series

(6) 3rd Coat: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy K46WOO151 Series

G. Metal Door and Frame

1. Pre-Catalyzed Waterbased Epoxy (MPI 141)

a. Semi-Gloss Finish

(7) 1st Coat: S-W Pro Industrial Pro-Cryl Industrial Primer, B66-310 Series.

(8) 2nd Coat: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy K46-151 Series

(9) 3rd Coat: S-W Pro Industrial Pre-Catalyzed Waterbased Epoxy K46-151 Series

PART 3 - EXECUTION

3.1 PREPARATION OF SURFACES

A. Cleaning: Remove accumulated dirt and loose dust by brushing or wiping.

B. Concrete Masonry: Clean all excess mortar, loose and foreign material using metal scraper and wire brush. Remove all grease and oil spots by suitable cleaning compound and rinse (to remove alkali). If necessary, neutralize by washing with zinc sulphate solution.

C. Gypsum Board: Inspect joint and nail-head treatment; correct all imperfections before proceeding. Remove all dust and dirt by use of a soft cloth or brush.

D. Metal: Surfaces shall be free of rust and loose scale. Clean with mineral spirits before painting. Surfaces which will be inaccessible after installation shall be completely painted before installation. Prime field welds, bolts and rivets.

1. Aluminum: Clean and remove all lacquer or other protective coating.

2. Steel: Wipe shop primed metal clean of foreign matter, retouch where scratched, marred or rusted using similar primer. As soon as practical after erection (to minimize rusting) wire brush structural and miscellaneous steel and touch-up welds, scratches and abrasions of shop applied primer.

E. Wood: Sandpaper smooth. Before installation apply wood-sealer. Back-prime trim and prime cut ends to match finished surface. Ease sharp knife-edge corners by rubbing with fine sandpaper. Remove soil by wiping using clean cloth moistened with alcohol.

3.2 APPLICATION

A. Workmanship: Read and conform to instructions in label on containers. Materials

uniformly spread and smoothly finished. Do not thin in excess of the printed directions. Mix and apply in accordance with manufacturer's directions. Field applied priming coats shall be applied as soon as possible after the work is received or in place. Apply coats by brush or roller. Coverage of products shall not be less than that recommended by manufacturer. When finishing operating parts, the parts shall be painted in the "open" position and shall remain so until dry. Metal surfaces required to be bare for proper operations shall be kept free of paint. Cut sharp lines at different colors, glass and other unpainted materials. In painted work each coat shall differ in color from the preceding and succeeding coats.

3.3 COLORS

A. Colors shall match colors scheduled by on drawing schedule or as selected by Architect and approved by VPS.

B. Colors for surfaces not scheduled:

1. Access Panels: Match adjacent wall or ceiling.

2. Electric and Telephone Panels: Match adjacent walls or ceiling.

3. Closets: Match spaces into which they open.

4. Steel Door Frames: Match door.

5.. Interior of Ducts Visible Through Grilles: Matte black.

3.4 TOUCH-UP

A. Retouch finished surfaces, including factory finished items, necessary so work is neat, clean and unblemished at time of substantial completion.

3.5 CLEANING

A. Keep freshly coated surfaces, brushed and cans clean and dust free. Remove paint splatters and daubs from hardware, glass, floors and any other surfaces not indicated to be painted.

END OF SECTION 09 91 00

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SECTION 09 96 53 - ELASTOMERIC COATING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide a breathable elastomeric finish coating on exterior Portland Cement Stucco wall, exposed masonry and as indicated on the drawing and specifications.

1.2 RELATED SECTIONS

A. Drawing and General Provisions of the Contract including General and Supplemental Conditions to the Contract.

B. Section 09 24 23, "PORTLAND CEMENT PLASTER"

C. Section 04 22 00, "CONCRETE UNIT MASONRY"

1.3 REFERENCE STANDARDS

A. The latest edition of publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

1.	ASTM D 412	Vulcanized Rubber and Thermoplastic Elastomers - Tension
2.	ASTM D 1653	Water Vapor Transmission of Organic Coating Films
3.	ASTM D 1849	Package Stability of Paints
4.	ASTM D 2240	Rubber Property – Durometer Hardness
5.	ASTM D 2369	Volatile Content of Coatings
6.	ASTM D 3273	Resistance to Growth of Mold
7.	ASTM D 3274	Evaluating Degree of Surface Disfigurement of Paint Films by Microbial Growth of Soil and Dirt Accumulation

8. ASTM D 3960 Volatile Organic Compound Content of Paint and Related Coatings

1.4 SUBMITTALS

A. (SD-01) Manufacturer's Product Data: Submit data and application instructions for each product.

B. (SD-16) Submit colors for selection.

C. (SD-14) Submit specimen copy of manufacturer's warranty.

D. (SD-10) Submit laboratory test reports for compliance with referenced standards.

1.5 MOCKUPS

A. Apply benchmark samples of the elastomeric coating system indicated to verify preliminary selections made under sample submittals to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select two areas to represent surfaces and conditions for application of elastomeric coating to each type of substrate.

a. Wall Surfaces: Provide two samples of at least 100 sq. ft.

2. Final approval of color selections will be based on benchmark samples.

a. If preliminary color selections are not approved, apply additional benchmark samples of additional colors selected by Architect at no added cost to Owner.

1.6 PRODUCTS DELIVERY, STORAGE AND HANDLING

A. Deliver in sealed containers with labels legible and intact.

B. Store in accordance with manufacturer's directions.

1.7 PROJECT CONDITIONS

A. Comply with manufacturer's recommendations as to environmental conditions under which coating system can be applied.

B. Do not apply elastomeric coating when the ambient or surface temperature is expected to fall below 40 degrees F within 24 hours of application.

C. Do not apply elastomeric coating when there is a threat of rain within the next 24 hours or the relative humidity is in excess of 90 percent.

D. Do not apply finish in areas where dust is being generated.

E. Cover or otherwise protect finished work of other surfaces not being coated concurrently or not to be coated.

1.8 COATING ADHESION TESTS

A. Verify that coating is obtaining proper adhesion to the substrate as described in the manufacturer’s coating and application guide.

1. Perform field adhesion tests on each type of substrate to verify proper adhesion is achieved without the use of a primer. Test on all four sides of the building.

2. If adhesion does not meet manufacturer’s requirements, perform a field adhesion test using manufacturer’s primer and apply the two coats as recommended by the manufacturer applications of coating.

1.9 MANUFACTURER’S WARRANTY

A. Provide coating manufacturer's 10 year warranty against defective materials.

B. Warranty shall protect against peeling, cracking, blistering, flaking and other defects that would cause coating to allow moisture to migrate into substrate.

C. Cost of labor and materials to repair or replace defective materials shall be included.

1.10 APPLICATOR’S WARRANTY

A. Provide a 5 year applicator’s warranty against defective workmanship.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

A. Dow Corning AllGuard Silicone Elastomeric Coating and AllGuard Primer.

2.2 MATERIALS

A. Type: One-component, pigmented, water-based silicone elastomer.

1. Forms a flexible membrane impervious to water but has ability to breathe allowing water vapor to escape from inside the substrate.

B. Properties as supplied:

1. Solids Content: 58.6 percent by weight; ASTM D 2369.

2. High Temperature Stability: Greater than 28 days; ASTM D 1849.

3. Volatile Organic Content: 0.459 lb/gal; ASTM D 3960.

C. Properties as cured:

1. Durometer Hardness: 38 Shore A; ASTM D 2240.

2. Tensile Strength: Greater than 145 psi; ASTM D 412.

3. Elongation: 600 percent; ASTM D 412.

4. Fungus Resistance: No growth; ASTM D 3274.

5. Mold Resistance: No growth; ASTM D 3273.

6. Water Vapor Permeance: 43.2 English Perms; ASTM D 1653.

D. Colors: colors selected by the Architect.

2.3 PATCHING AND SEALING

A. Provide Dow Corning 790, 791, or 795 silicone building sealant as recommended by the manufacturer.

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. General: Comply with the manufacturer’s most recent printed Coating Application and Maintenance Guide for all surfaces to be coated.

B. All surfaces to receive this coating shall be free of dirt, frost, oil, grease, mold, fungus, efflorescence, laitance, peeling of existing coating, chalking of existing coating and any other foreign material which will inhibit bonding to the substrate’s exterior surface.

A. Pressure wash, wire brush or grind the concrete surfaces to remove all the above materials.

1. Pressure wash the split faced concrete masonry units as recommended by the manufacturer to remove the foreign materials listed above.

D. Repair any damaged concrete areas, concrete masonry units and plaster surfaces. Repair any cracks larger than 1/16-inch wide with silicone sealant as recommended by the manufacturer of this product.

3.2 COATING ADHESION TEST

A. Before application of the elastomeric coating, perform coating adhesion tests as specified and recommended by manufacturer.

3.3 APPLICATION

A. Mix and apply in accordance with manufacturer's directions and as specified.

B. Apply coating only when moisture content of surface is within limitations recommended by coating manufacturer. Test with moisture meter.

C. Apply coating with roller or spray equipment recommended by coating manufacturer.

D. Application Thickness:

1. Two total coats are required. Provide a minimum of 10 mil total dry film thickness.

E. Final coat shall be smooth, free of pinholes, laps, pile up of coating and skipped or missed areas.

3.4 CLEANING

A. Remove spilled, splashed or splattered coating from adjacent surfaces and surfaces not scheduled to be coated.

B. Do not mar surface finish of item being cleaned.

END OF SECTION 09 96 53

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SECTION 10 14 16 - PLAQUE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Conditions of the Contract and Division 1, as indexed, apply to this Section.

1.2 SCOPE

A. Supply and install all Plaques as shown on Drawing AG514 and as specified herein.

B. Owner will supply final graphic for Airport seal.

C. Owner will supply a final list of County commissioners & Mayor, List of airport administrators, name of Architect and General Contractor.

1.3 GUARANTEE

A. Per General Conditions.

1.4 SUBMITTAL

A. (SD-04) Submit Shop Drawings: Drawing proof of layout, and mounting details
B. (SD-01) Product data: Manufacturer product literature and material
C. (SD-16) Samples: Submit two samples of metal finish selected and samples of any exposed hardware.

PART 2 - PRODUCTS

2.1 MANUFACTUER

A. Ramos, Architectural Signage Systems (405) 235-5505

B. Metal Arts, (800) 237-8069

C. OMC Industries, Inc., (800) 488-4662, or accepted equal.

D. Accepted Equal.

2.2 BUILDING PLAQUE

A. Sign type model I-89.

B. Bronze 32 “x 38”

C. Standard raised letters font type as shown on drawing or as selected by Architect

D. Manufacturers:

1. A.R.K. Ramos Architectural Border, BR-400 background.
2. Gemini Plaques
3. Or approved equal.

E. Sign to list the following as indicated AG514:

1. Airport Seal and County Seal

2. Name of Project

3. County Board Chairman

4. County Board of County Commissioners List

5. Name of Airport Executive Administrator, Assistant Administrator

6. Year of Construction

7. Name of Architectural Firm

8. Name of General Contractor Firm

F. Beveled edge

G. Surface mounted blind mount.

H. Lettering “FRUTIGER BOLD”

2.4 BUILDING ADDRESS NUMBERS FOR BUILDING

A. Injection molded plastic - color black.

B. 6” high

C. Style “FRUTIGER BOLD”

D. 6 numbers

PART 3 - EXECUTION

3.1 MEASUREMENTS

A. Verify all dimensions shown on Drawings by taking field measurements; proper fit and attachment.

3.2 COORDINATION

A. Coordinate with all other trade whose Work relates to plaque installation for placing of all required blocking, sub-framing, backing, furring, filled cells etc., to insure proper locations. Surface attachment.
B. Final location for the Plaque will be as directed by VPS.
C. Final location of building numbers as directed by Building Department and Architect.

3.3 DELIVERY AND STORAGE

A. Deliver and store materials in dry, protected areas. Keep free of corrosion or other damage. Replace any damaged plaque at no cost to Owner.

3.4 INSTALLATION

A. Install all plaque as per manufacturer's published instructions and accepted installation layouts. Provide and size all templates for proper coordination and placement of anchor in masonry walls.
B. General Contractor install support in wall, IE steel angles, plates, filled cell with concrete.

3.5 CLEAN-UP

A. Per General Conditions.

END OF SECTION 10 14 16

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SECTION 10 21 13 - TOILET PARTITIONS

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications Sections, apply to this Section.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.2 SUMMARY

A. Solid high density polyethylene (HDPE) resins toilet compartments including the following:

1. Section includes toilet partions, urinal screens and accessories to the extent shown on drawings and specifiec herein.

1.3 RELATED SECTIONS

A. Section 05 50 00, “Metal Fabrications”

B. Section 05 40 00, “Light-guage Steel Framing”

C. Section 06 10 00, “Rough Carpentry”

D. Section 09 30 00, “Tiling”

E. Section 10 28 13. “Toilet Accessories”

1.4 REFERENCES

A. ASTM A 666 - Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.

B. ASTM B 221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.

C. National Fire Protection Association (NFPA) 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.

D. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

1.5 SUBMITTALS

A. Submit under provisions of Section 01 33 23 – Shop Drawing, Product Data and Samples
   1. (SD-01)(SD-02)(SD-10) Product Data: Manufacturer's data sheets on each product to be used, including:
      a. Product Data.
      b. Storage and handling requirements and recommendations.
      c. Installation methods.
      d. Fire Resistance Compliance
   2. (SD-04)Shop Drawings: Provide layout drawings and installation details with location and type of hardware required. Drawing plans, elevations, details and hardware prepared to scale. Verify field dimensions prior to preparation of shopdrawings.
   3. (SD-15) Verification Samples: For each finish product specified, two samples representing actual product, color, and patterns. Submitt 6" square samples of panel material.
   4. (SD-14) Warranty Submittals:
      a. Submit manufacturers warranty.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: A company regularly engaged in manufacture of products specified in this section, and whose products have been in satisfactory use under similar service conditions for not less than 5 years.

B. Installer Qualifications: A company regularly engaged in installation of products specified in this Section, with a minimum of 5 years experience.

C. Materials: Doors, panels and pilasters, constructed from high density polyethylene (HDPE) resins. Partitions to be fabricated from polymer resins compounded under high pressure, forming a single component which is waterproof, nonabsorbent and has a self-lubricating surface that resists marks from pens, pencils, markers and other writing instruments. Cover all plastic components with a protective plastic during shipping and storage.

D. Warranty: Provide manufacturer's 25 year standard limited warranty.

E. Performance Requirements:
   1. Fire Resistance: Partition materials shall comply with the following requirements, when tested in accordance with ASTM E 84:

      a. Class A flame spread/smoke developed rating.

   2. Material Fire Ratings:

      a. National Fire Protection Association (NFPA) 286: Pass.
      b. International Code Council (ICC): Class B.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened packaging until ready for installation.

1.8 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.9 WARRANTY

A. Manufacturer guarantees its plastic against breakage, corrosion, and delamination under normal conditions for 25 years from the date of receipt by the customer. If materials are found to be defective during that period for reasons listed above, the materials will be replaced free of charge. Labor not included in warranty.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design:
1. Scranton Products, which is located at: 801 E. Corey St.; Scranton, PA 18505; Toll Free Tel: 800-445-5148; Fax: 855-376-6161; Email:request info (info@scrantonproducts.com); Web:www.scrantonproducts.com

2.2 MATERIAL

A. Plastic Panels: High density polyethylene (HDPE) suitable for exposed applications, waterproof, non-absorbent, and graffiti-resistant textured surface.

B. Zinc Aluminum Magnesium and Copper Alloy (Zamac): ASTM B 86.

C. Stainless Steel Castings: ASTM A167, Type 304.

D. Aluminum: ASTM 6463-T5 alloy.

2.3 SOLID HDPE TOILET COMPARTMENTS

A. Basis of Design: Hiny Hiders Toilet Partitions as manufactured by and supplied by Scranton Products.
1. Style: Floor mounted overhead-braced toilet compartments.

B. Doors, Panels, and Pilasters: 1 inch (25 mm) thick with all edges rounded to a radius. Mount doors and dividing panels based on height of specified and or as shown on drawing.
1. Door and Panel Height: 55 inches (1397 mm).
2. Pilasters: 82 inches (2083 mm) high and fastened to floor.

C. Panel Color: Warm Series.
1. As noted on the drawings
2. As noted on the drawings

D. Pilaster Shoes: 3 inches (76 mm) high type 304, 20 gauge stainless steel. Secured to pilasters with a stainless steel tamper resistant Torx head sex bolt.

E. Headrail: Heavy-duty extruded 6463-T5 alloy aluminum with anti-grip design. Finish to be clear anodized. Fastened to headrail brackets with stainless steel tamper resistant Torx head sex bolt, and fastened at the top of the pilaster with stainless steel tamper resistant Torx head screws.
   1. Headrail Brackets: 20 gauge stainless steel with satin finish. Secured to the wall with stainless steel tamper resistant Torx head screws.

F. Wall Brackets:
   1. Stainless Steel Brackets: Stainless steel type 304.
   2. Brackets are fastened to pilasters with stainless steel tamper resistant Torx head screws and fastened to the panels with stainless steel tamper resistant Torx head sex bolts.
   3. Bracket Type: Continuous 54 inches (1372 mm) stainless steel.

G. Door Hardware:
   1. Wrap-Around Hinges: 8 inches (203 mm) and fabricated from heavy-duty extruded aluminum. Hinges are through-bolted to pilasters and doors with stainless steel tamper resistant Torx head sex bolts. Hinges operate with field adjustable nylon cams. Cams can be field set in 30, 60 or 9 degree increments.
   2. Door Strike/Keeper: Heavy-duty extruded aluminum 6436-T5 alloy with a bright dip anodized finish. Secured to pilasters with stainless steel tamper resistant Torx head sex bolts. Bumper shall be made of extruded black vinyl.
      a. Style: 6 inches (152 mm) aluminum.
   3. Stainless Steel Slide Bolt Latch and Housing: Heavy-duty stainless steel type 304. The latch and housing to have a bright finish. The slide bolt and button to have a black anodized finish.
   4. Doors supplied with one coat hook/bumper and door pull made of chrome plated Zamak.
   5. Equip outswing handicapped doors with second door pull and door stop.

2.4 SOLID HDPE URINAL SCREENS

A. Provide plastic privacy screens in urinal as indicated on drawings

B. Panels, 1 inch (25 mm) thick with edges rounded to a radius. Screens to be mounted at 14 inches (356 mm) above the finished floor. Color to match toilet partitions
   1. Aluminum heat sink fastened to bottom edges.

C. Screen Type: Wall mounted.

   1. Urinal Screens: 18 inches (457 mm) wide by 55 inches (1397 mm) high.
   2. Wall Brackets: Stainless Steel Brackets: Stainless steel type 304.
   3. Brackets are fastened to pilasters with stainless steel tamper resistant Torx head screws and fastened to the panels with stainless steel tamper resistant Torx head sex bolts.
   4. Bracket Type: Continuous 54 inches (1372 mm) stainless steel.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared.

B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Examine areas to receive toilet partitions, screens, and shower compartments for correct height and spacing of anchorage/blocking and plumbing fixtures that affect installation of partitions. Report discrepancies to the architect.

3.3 INSTALLATION

A. Install in accordance with manufacturer's instructions.

B. Install partitions rigid, straight, plumb, and level manor, with plastic laid out as shown on shop drawings.

C. Clearance at vertical edges of doors shall be uniform top to bottom and shall not exceed 3/8 inch (9.5 mm).

D. No evidence of cutting, drilling, and/or patching shall be visible on the finished work.

E. Finished surfaces shall be cleaned after installation and be left free of imperfections.

3.4 PROTECTION

A. Protect installed products until completion of project.

B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 10 21 13

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SECTION 10 22 00 - DEMOUNTABLE WAL SYSTEM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications Sections, apply to this Section.

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.2 SUMMARY

A. Section Includes:

1. Non-progressive, movable and reconfigurable system of unitized or pre-assembled panels, from a single manufacturer.
2. Trim, Sealants, Hardware and Accessories.
3. Stainless steel 1/8-inch perforated transom panel as shown on drawings.

1.3 RELATED SECTIONS

A. Section 05 40 00, “Light-gauge Steel Framing”

B. Section 09 21 16, “Gypsum Board Assemblies”

C. Section 08 71 00, “Door Hardware and Schedule”

D. Section 08 80 00, “Glazing”

1.4 PERFORMANCE REQUIREMENTS

A. Installer Qualifications: Engage an experienced installer who has successfully completed demountable partition installations similar in material, design, and extent to that indicated for this Project and is mutually accepted by the manufacturer and Owner.

B. Structural Performance: Provide demountable partitions capable of withstanding the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

1. Load-Bearing Capacity of Panel System: Not less than 7 lbs./linear inch (3.175 kg/25.4 mm) distributed proof load when tested according to BIFMA X 5.6, Section 03, Table 06.
2. Transverse-Load Capacity of Panel System:
   a. Interior wall panel deflections shall not exceed 1/120 of the span for flexible facing material or 1/240 of the span for brittle facing materials

under a 5 psf (0.240 kN/m^2) uniform transverse design load per the 2017 FBC Table 1604.3. Interior wall panel deflections for glass panel frames shall not exceed 1/175 of the span or 0.75 inches, whichever is less under a 5 psf (0.240 kN/m^2) uniform transverse design load per the 2017 FBC Table 1604.3.

b. 2017 FBC, Section 1607.14: Interior demountable partition or butt-glazed entrances/storefronts wall products that exceed 6 feet (1829mm) in height, including their finish materials shall have adequate strength to resist the loads which they are subjected but not less than a horizontal load of 5 psf (0.240 kN/m^2).

C. Fire Retardancy: No flammable materials shall be used in the manufacture of the wall system. Provide independent laboratory tests for surface-burning characteristics of panel finishes in accordance with ASTM E-84. Flame Spread: Class A for powder coat finish and steel.

D. Combustibility Performance: Product shall have finishes and construction acceptable for use in Non-Combustible buildings, in accordance with Chapters 6 and 8 of the Florida Building Code, 2017 Edition.

E. ADA Compliance: Doorways shall be minimum clear opening of 36" of the door and the opposite stop, and shall have 80" (2030mm) minimum clear headroom.

See SECTION 08 7100 Door Hardware for Lockset.

F. Certification: Include supporting certified laboratory testing data indicating that material meets specified test requirements.

G. Mock Up for Verification Purposes: In a location designated by the Architect, install a full scale installation incorporating at least one of each type of panel, and accessory required, illustrating each installation condition. Retain mock up installation until completion of total installation or dismantle earlier at the direction of the Architect. Materials used for the mock up installation will not be considered part of either the base contract materials or the attic stock materials. If life cycle costs of the product are an important decision criteria, the mock up installation and reconfiguration should be timed, and the reuse of components should be evaluated.

1.5 CONSTRUCTION REQUIREMENTS

A. The extent of the demountable partition work as shown on the drawings, and as specified herein.

B. Provide all materials, labor, and equipment to install demountable partitions. The demountable wall system shall offer maximum flexibility and reusability to accommodate frequent and quick relocation work without loss of materials, damage or modification to panels or to adjoining structures such as ceilings, fixed walls and floors. The factory assembled system must be unitized or pre-assembled (not stick built), non-progressive and modular, allowing the removal of individual panels from any location without disturbing adjoining units and providing interchangeability of panels and door units on the

same module.

C. The head detail is recessed. See drawings.

D. The base assembly with an integrated leveling system shall be permanently attached to the panel. Detached and loosely shipped floor tracks and leveling components shall not be permitted.

E. Panels are stackable to accommodate ceiling height changes and panel type changes. See Elevations.

F. Factory installed panel shells or faces shall be removable and interchangeable in the field without dismantling as complete units.

G. The factory assembled demountable walls should be flexible to accommodate the building conditions. The demountable wall should have flexible vertical adjustability. An Adjustable, u-channel head assembly shall provide a ± ½” adjustment at the ceiling. At the floor, a self-contained leveling glide system and a flush 5”- high base cover shall allow for an adjustment of ± 1 ½” for a 5” base. Combined, this shall provide an overall vertical adjustment of ± 2” for a 5” to compensate for ceiling and floor irregularities. Where the wall system meets the building core walls, columns or window mullions, a telescopic, spring-loaded wall post or U-channel shall allow for a ±1” horizontal adjustment. All products shall be able to accommodate incremental sizes to a 1/16 IN increments.

H. Provide stainless steel countersunk screws at each end of base to secure to vertical frame members.

1.6 SUBMITTALS

A. Submittals for 01 33 23 Shop Drawing, Product Data and Samples.

1. (SD-01)(SD-02) Product Data: Product data on physical characteristics, durability, resistance to fading, and flame spread characteristics for each type of partition and accessory.

2. (SD-04) Shop Drawings: Shop drawings showing location and extent of partitions. Include plans, elevations, sections, details, and attachments to other work. Shop drawings shall be prepared by a signed and sealed by a Florida Professional Engineer. The submittal shall include certification by P.E. of securement at base and ceiling are in compliance with FBC Section 16.

3. (SD-15) Samples:

a. Samples for Initial Selection: Samples for initial selection purposes in form of manufacturers standard color charts showing full range of colors, textures, and patterns available for each type of material exposed to view.

b. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.

1. Panel Finish Face: Manufacturer’s standard-size unit, but not less than 3 inches (75mm) square.

2. Base Trim: 12-inch (300mm) long Samples.
3. Door Finish Face: Manufacturer's standard-size unit, but not less than 3 inches (75mm) square.
4. Glazing: Manufacturer's standard-size unit, but not less than 3 inches (75 mm) square.

4. (SD-10) Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each type of demountable partition.
5. Contract Closeout Information:
   a. (SD-14) Warranty.
   b. (SD-20) Maintenance Data: For demountable partitions to include in maintenance manuals.
      1. Recommended cleaning materials and warnings about cleaning methods that could be detrimental to finishes and performance.
      2. Installation manual detailing methods to move reuse and adjust demountable product.

1.7 PROJECT CONDITIONS

A. Delivery, Storage, and Handling: Deliver materials to Project Site in original factory wrappings and containers/skids, clearly labeled with identification of manufacturer, brand name, model number and order number. Store materials in original undamaged packages and containers, inside well ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity; store product according to installation manual and away from other trades.

B. Environmental Limitations: Do not deliver or install demountable partition components until building is enclosed and finishing operations, including ceiling and floor-covering installation and painting, are complete.

C. Field Measurements: Indicate measurements on Shop Drawings.

D. Coordination of Work: Coordinate layout and installation of demountable partition components with other units of Work. Installation of ceilings, floor coverings, lighting fixtures, HVAC equipment, and fire-suppression systems should be completed before demountable partitions are installed.

E. Special Requirements: Comply with instructions and recommendations of manufacture for special delivery, storage, and handling requirements.

1.8 EXTRA MATERIALS

A. Deliver to the Owner, not less than three percent of the Project total for each component, panel and accessory of each type, color, and finish of demountable partition system exclusive of material required to properly complete installation. Furnish accessory

components and installation tools as indicated on schedule. Furnish extra materials from same production run as materials installed. Package extra materials with protective covering, identified with appropriate labels.

1.9 WARRANTY

A. Demountable system glazed units, door frames, and related components to be without defects in material or workmanship for a period of ten (10) years from the date of delivery. Wood doors shall be warranted for ten (10) years from the date of delivery, subject to the manufacturer's terms and conditions. Third party supplied product such as door hardware and film applied to glass will be warranted based on their own warranty terms.

   This warranty does not cover defects or damage resulting from accidents, misuse, improper relocation methods or transfer to storage. Plastic laminates, and wood veneer finishes are not warranted against fading or wearing, or if improperly cleaned or treated by the Owner or by others.

1.10 NON-OBSOLENCE

A. Demountable system components and parts, with exception of third party supplied product (such as door hardware, glass, film applied to glass) are guaranteed to be compatible and available for purchase for ten years from date of the original order.

1.11 TSA Offices and Radio Charging room

A. Provide Stainless Steel angles and fasteners to secure Demountable wall system to the concrete floor slab. Include angle connectors at each corner post, at both jamb frames of doors and at all intermediate vertical frames.
B. Demountable partitions shall be 8'-0" in height.

PART 2 – PRODUCTS

2.1 DEMOUNTABLE PANEL PARTITIONS

A. Products: Subject to compliance with requirements, provide the Basis-of-Design Product, or one of the following:
   1. No Substitution Permitted.
   2. Basis-of-Design Product: Subject to compliance with requirements, provide KI "Genius Wall".
B. Aluminum Glass Framing:
   1. Frame Finishes: Clear Anodized.
   2. Glass Frame & Panel Conf. See Architectural Drawings.

C. Panel Connector or Joint Closure:

1. Connector Type: See Architectural Drawing.
2. Finish: Clear Anodized.

D. Trim: Base trim is continuous, factory-finished, snap-on type or recessed; adjustable for variations in floor. Ceiling trim is continuous and compensates for ceiling irregularities.

1. Base Trim Profile: Flush.
2. Flush Base Trim Height: 5".
    a. Screw each end of 10'-foot section with stainless steel flush screws.
3. Ceiling Trim Profile: Recessed.
4. Exposed-Metal Trim Finish: Clear Anodized.

E. Aluminum Door Leaves: Manufacturer's standard aluminum extrusion and fully glazed.

1. Door Finish: Clear Anodized.

F. Door Frames: Manufacturer's standard aluminum extrusion, factory-machined to receive hardware, for 1-3/4-inch (45 mm) doors.

1. Frame Finishes: Clear Anodized.
2. Frame Height: Transom-height.
3. Transom Height finish (if applicable): Glass.
4. Frame Type: Single Reversible Pivot.

G. Door Hardware: As specified in hardware Section 08 71 00.

H. Glass and Glazing: Safety glazing in compliance with Glass and Glazing – Section 08 81 00.

1. Single Glazed Thickness: 3/8".
2. Glass Type: Tempered, Clear.
3. Translucent Film: as noted on Architectural Elevations.

I. Transom Security Panel: 1/8"-inch thick Stainless steel (#304) perforated panel with 1"-inch diameter perforations staggered, see Architectural Drawings.

2.2 FABRICATION

A. Demountable Panels: Factory-assembled, flush, hollow unit construction; with faces smooth and free of buckles, oil canning, and seams; and insulated with solidly packed, formaldehyde free insulation. Fabricate panels for installation with concealed fastening devices and pressure-fit components that will not damage ceiling or floor coverings. Fabricate panels with continuous light-and-sound seals at floor, ceiling and

other locations where panels abut fixed construction.

1. Factory glaze panels to the greatest extent possible.

B. Components: Fabricate components for installation with concealed fastening devices and pressure-fit members that will not damage ceiling or floor coverings. Fabricate for installation with continuous seals at floor, ceiling, and other locations where partition assemblies abut fixed construction and for installation of sound attenuation insulation in partition cavities.

2.3 FINISHES, GENERAL

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved samples and are assembled or installed to minimize contrast.

2.4 PREPARATION

A. Prior to installation of demountable partition system, clean floor to remove dust, debris, and loose particles.

B. Maintain temperature in the area of installation at a constant minimum of 65 degrees F with relative humidity less than 70 percent for a period of 48 hours prior to installation and during installation process.

C. Demountable manufacturer determines that conditions are acceptable to receive the work of this section. Do not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to installer. Starting of work shall be construed as acceptance of conditions.

2.5 INSTALLATION

A. Install demountable partition systems rigid, level, plumb, and aligned. Install seals to prevent light and sound transmission at connections to floors, ceilings, fixed walls, and abutting surfaces.

   a. Installation Tolerance: Install each demountable partition so surfaces vary not more than 1/8 inch (3 mm) from the plane formed by the faces of adjacent partitions.
   b. Panel top trim shall be customized to transition between the lower acoustical lay-in ceiling and the higher gypsum wall board ceiling.

B. Do not alter ceiling suspension system.

   a. Connect demountable partition top header to ceiling grid perpendicular to wall.
   b. Connect demountable partition to galvanized metal framing behind finish gypsum board. See Architectural Drawings.

C. Install door-and-frame, solid panel and frame, and glazing-and-glazing frame assemblies securely anchored to partitions and with doors aligned and fitted. Install and adjust door hardware for proper operation.

2.6 DEMONSTRATION

A. Engage a factory-authorized service representative to demonstrate and train Owner’s maintenance personnel to adjust, operate, and maintain demountable partitions. Refer to Division 01 and Section 01 79 00 “Demonstration and Training”.

END OF SECTION 10 22 00

SECTION 10 26 23 - IMPACT RESISTANT WALL PROTECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:
   1. Wall guards.

1.3 SUBMITTALS

A. (SD-01)(SD-02) Product Data: Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes for each impact-resistant wall-protection unit.

B. (SD-04) Shop Drawing: Include plan showing location of corner guards, plan detail for mounting and height.

C. (SD-16) Sample: Submit a sample for color and texture.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store impact-resistant wall-protection units in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Aluminum Extrusion: 6063 T5.

B. Adhesive: Type recommended by manufacturer for use with material being adhered to substrate indicated.
   1. Use adhesives and sealants that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

      a. Gypsum Board and Panel Adhesives: 50 g/L.
      b. Multipurpose Construction Adhesives: 70 g/L.
      c. Contact Adhesive: 250 g/L.

2.2 CORNER GUARDS

A. Surface-Mounted, Metal Corner Guards: Fabricated from 1-piece, formed metal with formed edges; with 90- or 135-degree turn to match wall condition.

1. Material: Aluminum 6063 T5

2. Manufacturer: Fry Reglet – DMCT-1250 or approved Equal.

3. Mounting Mechanical Fastening as required by manufacturer.

2.3 FABRICATION

A. Fabricate impact-resistant wall-protection units to comply with requirements indicated for design, dimensions, and member sizes, including thicknesses of components.

2.4 METAL FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
   1. Remove tool and die marks and stretch lines or blend into finish.
   2. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.

B. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

C. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
   1. Examine walls to which impact-resistant wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
   2. For impact-resistant wall-protection units attached with adhesive or foam tape, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
   3. Proceed with installation only after unsatisfactory conditions have been corrected.

4. Corner guard edges will be buffed to remove any sharp edge. All metal edges will be rounded.

3.2 PREPARATION

A. Complete finishing operations, including painting, before installing impact-resistant wall-protection system components.

B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

A. General: Install impact-resistant wall-protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

3.4 CLEANING

A. Clean using methods and materials recommended in writing by manufacturer and or supplier of aluminum corner guards.

END OF SECTION 10 26 23

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SECTION 10 28 13 - TOILET ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes toilet accessory items. Refer to the Toilet Accessory Schedule on the Drawings.

B. Reference Section 08 80 00, “Glazing” for wall mirrors

1.2 SUBMITTALS

A. (SD-01) Product data for each toilet accessory item specified, including construction and mounting details, dimensions, gages, profiles, specified options, and finishes.

B. (SD-07) Schedule indicating types, quantities, sizes, and installation locations (by room) for each toilet accessory item to be provided for Project.

C. (SD-04) Setting Drawings where cutouts are required in other Work, including templates, substrate preparation instructions, and directions for preparing cutouts and installing anchorage devices.

D. (SD-20) Maintenance instructions including replaceable parts and service recommendations.

E. (SD-14) Sample warranties.

1.3 QUALITY ASSURANCE

A. Inserts and Anchorages: Furnish accessory Manufacturers' standard inserts and anchoring devices that must be set in concrete or built into masonry. Coordinate delivery with other Work to avoid delay.

B. Single-Source Responsibility: Provide products of same Manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise acceptable to Architect.

C. Performance Requirements:

1. Grab Bar Structural Requirements: FBC 1607.7

1.4 PROJECT CONDITIONS

A. Coordinate accessory locations, installation, and sequencing with other Work to avoid interference with and ensure proper installation, operation, adjustment, cleaning, and servicing of toilet accessory items.

1.5 WARRANTY

A. Toilet Accessory Warranty: Provide manufacturers one year warranty from the Date of Substantial Completion, against defects in material and workmanship.

B. Mirror Warranty: Written warranty executed by mirror manufacturer, agreeing to

replace mirrors that develop visible silver spoilage defects within 15 years from the Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TOILET ACCESSORY MANUFACTURERS

A. Manufacturers: Listed on Schedule and as shown on drawings

2.2 MATERIALS, GENERAL

A. Stainless Steel: AISI Type 302/304, with polished No. 4 finish brushed,
0.034-inch (22-gage) minimum thickness.

B. Brass: Leaded and unleaded, flat products, ASTM B 19; rods, shapes, forgings, and flat products with finished edges, ASTM B 16; Castings, ASTM B 30.

C. Sheet Steel: Cold-rolled, commercial quality ASTM A 366, 0.04-inch (20-gage) minimum. Surface preparation and metal pretreatment as required for applied finish.

D. Galvanized Steel Sheet: ASTM A 527, G60.

E. Chromium Plating: Nickel and chromium electro-deposited on base metal, ASTM B 456, Type SC 2.

F. Mirror Glass: Nominal 6.0-mm (0.23-inch) thick, conforming to ASTM C 1036, Type I, Class 1, Quality q2, and with silvering, electro-plated copper coating, and protective organic coating.

G. Galvanized Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.

H. Fasteners: Screws, bolts, and other devices of same material as accessory unit, or of galvanized steel where concealed.

2.3 FABRICATION

A. No names or labels are permitted on exposed faces of toilet and bath accessory units. On either interior surface not exposed to view or on back surface, provide identification of each accessory item either by a printed, waterproof label or a stamped nameplate indicating Manufacturer's name and product model number.

B. Surface-Mounted Toilet Accessories, General: Except where otherwise indicated, fabricate units with tight seams and joints, exposed edges rolled. Hang doors or access panels with continuous stainless steel piano hinge. Provide concealed anchorage wherever possible.

C. Recessed Toilet Accessories, General: Except where otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors or access panels with full-length, stainless steel piano hinge. Provide

anchorage that is fully concealed when unit is closed.

D. Framed Mirror Units, General: Fabricate frames for glass mirror units to accommodate wood, felt, plastic, or other glass edge protection material. Provide mirror backing and support system that will permit rigid, tamperproof glass installation and prevent moisture accumulation, as follows:

1. Provide galvanized-steel backing sheet, not less than 0.034 inch (22 gage) and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.

E. Mirror Unit Hangers: Provide system for mounting mirror units that will permit rigid, tamperproof, and theft proof installation, as follows:

1. One-piece, galvanized-steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
2. Heavy-duty wall brackets of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.

F. Keys: Provide universal keys for access to toilet accessory units requiring internal access for servicing and re-supply. Provide six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install toilet accessory units according to manufacturers' instructions, using fasteners appropriate to substrate as recommended by unit manufacturer. Install units plumb and level, firmly anchored in locations and at heights indicated.

B. Secure mirrors to walls in concealed, tamperproof manner with special hangers, toggle bolts, or screws. Set units plumb, level, and square at locations indicated, according to Manufacturer's instructions for type of substrate involved.

C. Install grab bars to withstand a downward load of at least 250 lbf, complying with ASTM F 446, and in accordance with Performance Requirements.

D. Install changing stations to within static loads of 400 lbf. and per manufacturer’s recommended instructions.

3.2 ADJUSTING AND CLEANING

A. Adjust toilet accessories for proper operation and verify that mechanisms function smoothly. Replace damaged or defective items.

B. Clean and polish all exposed surfaces strictly according to manufacturer's recommendations after removing temporary labels and protective coatings.

3.3 TOILET ACCESSORIES SCHEDULE

See schedule on drawings A457

END OF SECTION 10 28 13

SECTION 10 43 13 - DEFIBRILLATOR CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Defibrillator cabinets, accessories, and installation.
2. Automated external defibrillators (AED's)

1.3 ACTION SUBMITTALS

A. (SD-01)(SD-02) Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for AED cabinets.

1. Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.
2. Automated External Defibrillator

B. (SD-04) Shop Drawings: For defibrillator cabinets. Include plans, elevations, sections, details, and attachments to other work.

C. (SD-15) Samples: For each type of exposed finish required.

1. Samples for Initial Selection: For each type of exposed finish required.
2. Samples for Verification: For each type of exposed finish required, prepared on Samples 6 by 6 inches square.

D. (SD-07) Product Schedule: For defibrillator cabinets. Indicate whether recessed, semi recessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.4 CLOSEOUT SUBMITTALS

A. (SD-20) Maintenance Data: For AED cabinets and AED’s to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Pre-installation Conference: Conduct conference at Project site.

1. Review methods and procedures related to AED cabinets including, but not limited to, the following:
   a. Schedules and coordination requirements.

C. Qualifications:

1. Installer experienced in performing work of this section who has specialized in installation of work similar to that required for this project.
2. Manufacturer Qualifications: Manufacturer capable of providing field service representation during construction and approving application method.

1.6 DELIVERY, STORAGE & HANDLING

A. Delivery:

1. Deliver materials in manufacturer’s original packaging with identification labels intact.

B. Storage and Protection:

1. Store materials protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.

1.7 SEQUENCING

A. Sequence with Other Work: Comply with defibrillator cabinet manufacturer’s written recommendations for sequencing construction operations.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

B. Stainless-Steel Sheet: ASTM A 666, Type 304.

C. Tempered Float Glass: ASTM C 1048, Kind KT, Condition A, Type I, Quality q3, 1/8 inch, Class I (clear).

2.2 AED CABINET

A. Cabinet Type: Suitable for mounting AED with emergency telephone and alarm.

B. Basis of Design manufacturer: Potter Roemer LLC; or a comparable product by one of the following:

1. J. L. Industries, Inc., a division of Activar Construction Products Group;.
2. Larsen's Manufacturing Company.

C. Cabinet Interior Size: 14 inches wide by 14 inches high by 6-3/4 inches deep, as required to incorporate AED and specified features. All cabinet components and equipment shall be accessible, removable and replaceable with the cabinet door in a 90 degree position.

D. Cabinet Material: Stainless-steel sheet.

E. Recessed Cabinet: Cabinet box recessed in walls of sufficient depth to suit style of trim.

F. Cabinet Trim Material: Stainless-steel sheet.

G. Door Material: Stainless-steel sheet.

H. Door Style: Provide limited visibility window.

I. Door Glazing: Tempered float glass.

J. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide manufacturer's standard.
2. Provide continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.

K. Accessories:

1. Identification: Manufacturer's standard.

L. Finishes:

1. Manufacturer's standard baked-enamel paint for the interior of cabinet.
2. Stainless Steel: No. 4.

M. Cabinet Interior Features:

1. Emergency Phone Box.
2. Cable Access Box
3. Raceway

N. Alarm:

1. Circuitry Board.
2. Alarm Circuitry
3. Alarm Key Switch and Key:
4. Control for Visual Alarm, Audio Alarm and Relay Closures:

O. Power Requirements for Alarm Board, Siren and LED:

2.3 AUTOMATED EXTERNAL DEFIBRILLATOR (AEDS)

A. Basis-of-Design Product: Subject to compliance with requirements, provide Philips Heartstart OnSite Defibrillator or comparable approved product meeting all requirements.

B. Refer to Sections 01 2500 “Substitution Procedures” and 01 6000 “Product Requirements” for comparable product requirements.

2.4 FABRICATION

A. AED Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

1. Weld joints and grind smooth.
2. Provide factory-drilled mounting holes.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 GENERAL FINISH REQUIREMENTS

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical finishes on exposed surfaces of AED cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish AED cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.6 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Directional Satin Finish: No. 4.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where recessed cabinets will be installed.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Prepare recesses for recessed fire protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install AED cabinets in locations and at mounting heights, at heights acceptable to the Fire Department and according to the Florida Building Code – Accessibility, 2017.

B. AED Cabinets: Fasten cabinets to structure, square and plumb.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust cabinet doors to operate easily without binding.

C. On completion of cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by AED cabinet and mounting bracket manufacturers.

E. Replace AED cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 43 13

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SECTION 10 44 14 - FIRE EXTINGUISHERS AND WALL CABINETS

PART 1 - GENERAL

1.1 DESCRIPTION

A. Provide portable fire extinguishers and fire extinguisher cabinets specified and indicated on drawings.

1.2 REFERENCE STANDARDS

A. The latest edition of publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

NATIONAL FIRE PROTECTION ASSOCIATION

1. NFPA 10 Portable Extinguishers

UNDERWRITERS LABORATORIES (UL)

1. UL 299 Dry Chemical Fire Extinguishers

1.3 STANDARDS

A. Conform to NFPA 10 requirements for extinguishers.
B. Fire extinguishers and cabinets shall be obtained from one manufacturer.

1.4 SUBMITTALS

A. (SD-01)(SD-02) Manufacturer's Product Data: Submit data on each product, include installation instructions, color and finish, installation details, rough-in measurements and description of cabinet door and trim.
B. (SD-20) Submit manufacturer's operation and maintenance data.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. The following manufacturers are acceptable subject to providing products equal to that specified.

1. J.L. Industries, Bloomington, MN.
2. Larsen's Manufacturing Co., Ft. Lauderdale, FL.
3. Modern Metal Products, Owatonna, MN.
4. Potter-Romer, Inc., Cerritos, CA.

B. Products of Larsen's Manufacturing Co. are specified to establish quality, type and

design. Approved products of listed manufacturers will be acceptable.

C. Portable extinguishers shall be listed and labeled to meet or exceed all performance standards of UL 299.

2.2 FIRE EXTINGUISHERS

A. As identified on Drawing AL710

B. Heavy duty steel cylinder; Metal valves, siphon tubes and pressure gage; pull pin squeeze grip operation; by Larsen's Manufacturing Co. or equivalent.

2.3 CABINETS

A. Provide Model SS2409-R3 Architectural Series by Larsen's Manufacturing Co. or approved equivalent. Recessed tub shall be white baked enamel finish on cold rolled steel. Door and trim shall be 304 stainless steel with No. 4 satin finish, each fabricated from one piece of material. Provide fire-rated cabinets when they are indicated in fire-rated partitions.

B. Provide "Helvetica" style identification decal when required.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install cabinets plumb and level in wall openings 36-inches from finished floor to inside bottom of cabinet.

B. Secure rigidly in place in accordance with manufacturer's instructions.

3.2 LOCATIONS

A. As shown on drawings. If not shown place extinguishers so that travel distance to an extinguisher does not exceed 75-feet from any area of the building and the area covered does not exceed 6,000-square feet for light hazard.

3.3 CLEAN-UP

A. Clean glass and cabinets. Touch-up damaged finishes.

END OF SECTION 10 44 14

SECTION 10 50 20 - ALUMINUM SUN SHADE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. To the extent shown on drawings and specified here in.
2. Building supported, pre-engineered metal canopies including fascia channels, decking, tension rods, and attachment hardware.

1.2 Related Sections:

A. Division 01: Administrative requirements

B. Section 03 30 00, “Cast-in-place Concrete”

C. Section 04 22 00, ”Concrete Unit Masonry”

D. Section 07 62 00, “Sheet Metal Flashing and Trim”

E. Section 09 24 23, “Portland Cement Plaster”

F. Section 09 91 00, “Painting”

1.3 REFERENCES

A. Aluminum Association (AA)DAF 45 - Designation System for Aluminum Finishes.

B. American Architectural Manufacturers Association (AAMA)
2603 - Voluntary Specification, Performance Requirements and Test Procedures for Pigmented Organic Coatings on Architectural Extrusions and Panels.

C. American Society of Civil Engineers (ASCE) 7 - Minimum Design Loads for Buildings and Other Structures.

D. ASTM International (ASTM)
1. B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
2. B429 - Standard Specification for Aluminum-Alloy Extruded Pipe and Tube.

1.4 SYSTEM DESCRIPTION

A. Design Requirements: Design canopy system to withstand:
1. Standards for wind pressure, as shown on the drawing wind diagram and wind

pressures requirements on the structural drawings.

1.5 SUBMITTALS

A. Submit the following per Section 01 33 23 Shop Drawings, Product Data and Samples

1. (SD-01)(SD-02)Product Data: Manufacturer printed data for material and compliance with standards.
2. (SD-04)(SD-05)Shop Drawings: Indicate system components, dimensions, attachments, and accessories. Provide signed and sealed calculations and drawings prepared by a Florida Registered Professional Engineer.
3. (SD-15) Samples: 3 x 3 inch coating samples in specified color. 6-inch-long fascia extrusion sample showing profile and standard finish.6 inch decking samples showing profile and standard finish.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Minimum 5 years' documented successful experience in installation of MASA products. Provide a list of installations in Florida with references. Include name, address, and phone number.
B. Mockup: Provide mockup of canopy system including all framing members, supports, decking, hanger rods, and attachments at location selected by architect.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Bais of design: Extrudeck Series By: MASA Architectural Canopies, 21 Randolph Ave.,Avenel, NJ 07001. 800-761-7446, www.architecturalcanopies.com.
B. Or approved substitution.

2.2 MATERIALS

A. Aluminum Extrusions:

1. ASTM B221& ASTM B429 6061-T6511 alloy and temper.

B. Hardware:

1. All fasteners shall be Type 304 stainless steel.

2.3 COMPONENTS

C. Framing
1. Type: 8" X .125" Extruded Aluminum "J" Channel (6063-T5)

D. Decking:

1. Type: 3” x 6” x .090” Interlocking Extruded Aluminum Flat Soffit Decking (6063-T5)

E. Mounting

1. Type: Hanger Rod Supported- 3” x 2 1/2" x 1/4” I-Beam Outriggers (6061-T6511) W/3/4"D Schedule 40 Steel Pipe (A500), Escutcheon Plate - 6 SQU (S):

F. Profile/ Crown Profile

1. Profile Variables - IND LT 8 (S) Crown

2.3 ACCESSORIES

A. Drainage:

1. Concealed internal drainage with downspout, Formed .090” Aluminum (AA5052-H32). Final location to be selected and approved by Architect.

2.4 FABRICATION

A. Fabricate canopy system in accordance with approved Shop Drawings. Kit canopies to be mechanically assembled with shear stress strength as per engineering. Pre- assembled canopies are shop welded by MASA approved personnel. Drainage system to be concealed type. Covered surfaces direct water to field drilled drain, to be coordinated at site. Location of drain to be approved by architect.

2.5 FINISHES

A. Pre- Treatment: Pre-treat to ASTM D1730 type B, Method 5 using a multi stage chromate process or an approved chrome- free pretreatment process approved by powder coating manufacturer for optimized weather resistance.
B. Finish coat: AAMA 2603 Thermosetting Polyester Resin-based Powder
C. Source: Tiger Drylac powder coating or approved equal.
D. Color: to be selected by architect from MASA color range or as indicated on the drawings.

PART 3 - EXECUTION

3.1 FIELD DIMENSIONS

A. Field verify dimensions of supporting structure at site of installation prior to fabrication.

3.2 INSTALLATION

A. Install in accordance with manufacturer's instructions and approved Shop Drawings.

B. Install components plumb and level, in proper plane, free from warp and twist.

C. Anchor system to building components per Shop Drawings; provide dimensional clearance for thermal expansion and contraction as noted and required by Shop Drawings and assembly instructions and recommendations from the manufacturer.

D. Install stainless steel flashing and counter flashing along building wall.

E. Install continuous bead of sealant along flashing joint between building and canopy.

F. Set bolts and plates in a full bead of silicone sealant.

3.3 TOUCH UP

A. Touch up paint minor scratches and abrasions on finished surfaces to match original finish.

END OF SECTION 10 50 20

SECTION 12 48 16 - ENTRANCE FLOOR GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections (including all sustainability requirements), apply to this Section.
B. Section 03 30 00, “Cast-In- Place Concrete”
C. Section 09 65 19, “LVT-Resilient Tile Flooring”

1.2 SUMMARY

A. Section includes recessed floor grilles and frames.

1.3 COORDINATION

A. Coordinate size and location of recesses in concrete to receive floor grilles and frames.

1.4 ACTION SUBMITTALS

A. (SD-01)(SD-02)Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for entrance floor grilles and frames.

B. (SD-04) Shop Drawings:
   1. Items penetrating floor grilles and frames, including door control devices.
   2. Divisions between grille sections.
   3. Perimeter floor moldings.

C. (SD-15) Samples: For the following products, in manufacturer's standard sizes:
   1. Floor Grille: Assembled section of floor grille.
   2. Frame Members: Sample of each type and color.

1.5 CLOSEOUT SUBMITTALS

A. (SD-20) Maintenance Data: For floor grilles and frames to include in maintenance manuals.

1.6 FIELD CONDITIONS

A. Field Measurements: Indicate measurements on Shop Drawings.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Products: Subject to compliance with requirements, provide the following:

1. Construction Specialties, Inc. – (Basis of Design)
2. Kadee Industries – KD58 Stainless steel Grating
3. Or approved substitution

2.2 FLOOR GRIDS

A. Model and Description-G6 GridLine-Cradel 2, type 302 Stainless Steel, 5/8” deep. Wires to be .090” X.150” electronically welded and spaced .145” apart.

2.3 GRID FRAMES:

A. SSA- Stainless Steel Angle Frame, Type 304 Stainless Steel with 1/*’ Exposed surface.

2.4 LOCK DOWN MECHANISM:

A. HL-Hidden Lock Down shall be a hidden device to secure the GridLine to the Concrete surface. Type 305 Stainless Steel.

2.5 ENTRANCE FLOOR GRILLES, GENERAL

A. Structural Performance: Provide floor grilles and frames capable of withstanding the following loads and stresses within limits and under conditions indicated:

1. Unit to withstand 1000 lb/wheel loads (load applied to a solid 5”x2” wide polyurethane wheel for 1000 passes without damage)

B. Accessibility Standard: Comply with applicable provisions in the Florida Building Code Fifth Edition - Accessibility.

2.6 FLOOR GRILLES

A. General: Provide manufacturer's standard floor-grille assemblies consisting of treads of type and profile indicated, interlocked or joined together by cross members, and other components needed to produce a complete installation.

B. Stainless-Steel Floor Grille: Type 304.

C. Lockdown: Hidden.

2.7 FRAMES

A. Provide manufacturer's standard SSA frames of 1/8” and style for grille type, for permanent recessed installation in subfloor, complete with installation anchorages and accessories. Unless otherwise indicated, fabricate frame of same material and finish as grilles.

2.8 MATERIALS

A. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.

B. Stainless-Steel Angles: ASTM A 276 or ASTM A 479/A 479M, Type 304.

2.9 FABRICATION

A. Shop fabricate floor grilles to greatest extent possible in sizes as indicated. Unless otherwise indicated, provide each grille as a single unit; do not exceed manufacturer's recommended maximum sizes for units that are removed for

maintenance and cleaning. Where joints in grilles are necessary, space symmetrically and away from normal traffic lanes.

B. Fabricate frame members in single lengths or, where frame dimensions exceed maximum available lengths, provide minimum number of pieces possible, with hairline joints equally spaced and pieces spliced together by straight connecting pins.

2.10 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run grain of directional finishes with long dimension of each piece.
2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
3. Directional Satin Finish: No. 4.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and floor conditions for compliance with requirements for location, size, minimum recess depth, and other conditions affecting installation of floor grilles and frames.

B. Examine roughing-in for drainage piping systems to verify actual locations of piping connections before floor grille and frame and drain pan installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install recessed floor grilles and frames to comply with manufacturer's written instructions at locations indicated and with top of floor grilles and frames in relationship to one another and to adjoining finished flooring as recommended by manufacturer. Set floor-grille tops at height for most effective cleaning action. Coordinate top of floor-grille surfaces with doors that swing across grilles to provide clearance under door.
B. Verification of Conditions, examine areas and condition. Do not proceed until all unsatisfactory conditions have been corrected.
C. Follow manufacturer’s installation instructions.

3.3 PROTECTION

A. After completing frame installations, provide temporary filler of plywood or fiberboard in floor-grille recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION 12 48 16

SECTION 22 00 00 – PLUMBING SUMMARY OF WORK

PART 1 - GENERAL

1.1 PRIMARY CONSTRUCTION CODES AND STANDARDS

a. Florida Building Code 6th Edition (2017)
b. Florida Building Code: Plumbing 6th Edition (2017)
c. Florida Building Code: Fuel Gas 6th Edition (2017)

1.2 CONSTRUCTION CRITERIA

A. A complete sanitary sewer system with waste and vent piping will be provided and connected to the site sanitary system.

B. Waste/Storm piping shall be cast iron no-hub piping with heavy duty no hub couplings above ground, and be schedule 80 DWV PVC below grade.

C. Condensate piping shall be Type L copper and be insulated with elastomeric insulation.

D. Pipe insulation shall comply with ASHRAE 90.1.

E. Building will have piped primary storm drainage piping connected to site civil storm drainage system.

F. Wall and floor/ground cleanouts will be indicated where required.

1. Restrooms main underground sanitary shall have cleanouts outside the building, located at grade.
2. Sanitary main will be routed to accommodate future restrooms.

G. A mop sink will be provided in janitor's closet.

H. Electric water heaters will be provided at the mechanical room or janitor’s closet. Water heating would be dedicated to the public bathrooms and mop sinks only. Water heaters, associated recirculation pumps, and mixing valves shall be provided.

I. Local temperature mixing valves will be utilized before each fixture.

J. Domestic hot water heater will store at 140 degrees. Point of use mixing valves will be installed on restroom sinks.

K. Domestic hot water system will have an appropriately sized domestic hot water recirculation pump.

L. Floor drains will be provided in each public toilet room, janitor's closet, mechanical rooms, break rooms with sinks, at drinking fountains, and where required for proper maintenance. The drains will have trap primer valves.

M. Wall hydrants (freeze-proof, box type hose bibs) shall be provided on the exterior perimeter of the building on the front and back sides. Hydrants to be spaced approximately 100 feet apart.

1. Hose bibs shall be provided in all gang toilet rooms. Located under one of the Lav's under the counter for each restroom.

2. Wall hydrants will also be located in the mechanical room, service yard, and adjacent to the roof access ladder at the base of the ladder.

N. The building shall be provided with 3" metered potable water service that will be distributed through mains, and branches to plumbing fixtures. Cold and hot water piping material will be type "L" copper (aboveground) and type "K" (belowground). The domestic water distribution system shall be constructed utilizing an adequately sized system sized to limit velocity to 5-7 fps to reduce noise and water hammer.

O. The domestic water is served from the city provider and is understood to be acceptable for domestic water service. Local water filters or softeners for any humidifier, heating, or steam system will be evaluated if required.

P. Hot water piping will be insulated with fiberglass pipe insulation with AHJ jacket. PVC jacket will be provided where exposed.

Q. Water hammer arrestors shall be provided at each fixture or battery of fixtures. Lavatories will be provided with thermostatic mixing valves at each location.

R. Area shut-off valves shall be provided at each branch take-off or group of fixtures in an area for maintenance isolation. (e.g. above lay-in ceilings) Valves will be located at accessible locations for ease of maintenance. All fixtures shall be provided with service stops.

S. Plumbing fixtures shall be commercial grade type which will provide more durable, long lasting fixtures.

T. Lavatory faucets shall be solid brass for long life. Fixtures will be specified to meet ADA accessibility requirements, and will be coordinated with architectural design to meet an appropriate design quality. Faucets at restroom lavatories shall be (hard wired) sensor controlled.

U. Water closets shall be vitreous china, dual flush 1.6/1.1 gallon, white, elongated, wall hung, siphon jet action with (hard wired) sensor flush valves.

V. Urinals shall be vitreous china, sensor 0.125 gallon flush valve (hard wired), white, wall hung, with integral trap.

W. Stainless Steel, water coolers will be wall hung, self-contained with bottle fill station, refrigerated type, with integrated filter, flush mount (dual height “bird bath” type) meeting ADA accessibility requirements.

SECTION 22 05 00 - COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Transition fittings.
3. Dielectric fittings.
4. Sleeves.
5. Escutcheons.
6. Grout.
7. Equipment installation requirements common to equipment sections.
8. Painting and finishing.
9. Concrete bases.
10. Supports and anchorages.

1.3 APPLICABLE STANDARDS

A. Code Compliance: Refer to Division 1. As a minimum, unless otherwise indicated, comply with all rules, regulations, standards, codes, ordinances and laws of local, state and federal governments and the amendments and interpretation of such rules, regulations, standards, codes, ordinances and laws of local, state and federal governments by the authorities having lawful jurisdiction.

B. ADA: Comply with the requirements of the Americans with Disabilities Act (ADA).

C. All equipment, accessories, etc. shall comply with the Buy America Act. Sub-Contractor shall coordinate with General Contractor for specific requirements.

D. Comply with the National Fire Protection Association (NFPA) Standards and other Codes and Standards as adopted by the Local Authority having Jurisdiction.

E. 2015 International Building Code: Conform in strict compliance to the International Building Code (IBC) and the amendments which are enforced by the local authority having jurisdiction.

1. 2015 International Building Code, Building
2. 2015 International Plumbing Code, Plumbing
3. 2015 International Plumbing Code, Fuel Gas

1.4 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and in chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:

1. CPVC: Chlorinated polyvinyl chloride plastic.
2. PE: Polyethylene plastic.
3. PVC: Polyvinyl chloride plastic.

1.5 SUBMITTALS

A. Product Data: For the following:

1. Piping materials.
2. Transition fittings.
3. Dielectric fittings.
4. Sleeves.
5. Escutcheons.
6. Grout.
7. Supports and anchorages.

1.6 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."
2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for Plumbing Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.8 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for plumbing installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for plumbing items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.1 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 22 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.2 JOINING MATERIALS

A. Refer to individual Division 22 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

F. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

G. Solvent Cements for Joining Plastic Piping:

1. CPVC Piping: ASTM F 493.
2. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

2.3 TRANSITION FITTINGS

A. AWWA Transition Couplings: Same size as, and with pressure rating at least equal to and with ends compatible with, piping to be joined.

1. Underground Piping NPS 2 and Larger: AWWA C219, metal sleeve-type coupling.

B. Flexible Transition Couplings for Underground Nonpressure Drainage Piping: ASTM C 1173 with elastomeric sleeve, ends same size as piping to be joined, and corrosion-resistant metal band on each end.

2.4 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

D. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

1. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.

E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

2.5 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.

D. PVC Pipe: ASTM D 1785, Schedule 40.

E. Molded PE: Reusable, PE, tapered-cup shaped, and smooth-outer surface with nailing flange for attaching to wooden forms.

2.6 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Type: With set screw.

1. Finish: Polished chrome-plated and rough brass.

D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

1. Finish: Polished chrome-plated and rough brass.

E. One-Piece, Stamped-Steel Type: With set screw or spring clips and chrome-plated finish.

F. Split-Plate, Stamped-Steel Type: With hinge, set screw or spring clips, and chrome-plated finish.

2.7 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.
2. Design Mix: 5000-psi, 28-day compressive strength.
3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 22 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing. Valves located above ceilings shall be positioned no further than arms length away from accessible ceiling opening.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
b. Chrome-Plated Piping: One-piece, cast-brass type with polished chrome-plated finish.
c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
d. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.

M. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.

N. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

   a. Steel Pipe Sleeves: For pipes smaller than NPS 6.
   b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.

4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.

O. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.

P. Verify final equipment locations for roughing-in.

Q. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 22 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

   1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
   2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
3. PVC Pressure Piping: Join schedule number ASTM D 1785, PVC pipe and PVC socket fittings according to ASTM D 2672. Join other-than-schedule-number PVC pipe and socket fittings according to ASTM D 2855.
4. PVC Nonpressure Piping: Join according to ASTM D 2855.

3.3 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install plumbing equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.5 PAINTING

A. Painting of plumbing systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting."

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

C. All plumbing equipment including but not limited to pipes and connectors shall be factory painted, and attachments above baffle ceiling will be field painted “Matte Black” under another Division of this specification. Coordinate with painting sub-contractor and provide all required prep to components to receive approved paint system.

D. Cover all labels required to be left unpainted by code with a removable plate painted ”Matte Black”.

3.6 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. As specified in Division 03 Section.

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 05 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor plumbing materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.8 GROUTING

A. Mix and install grout for plumbing equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 22 05 00

SECTION 22 05 16 - EXPANSION FITTINGS AND LOOPS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. All equipment, accessories, etc. shall comply with the Buy America Act. Sub-Contractor shall coordinate with General Contractor for specific requirements.

1.2 SUMMARY

A. Section Includes:

1. Flexible-hose packless expansion joints.
2. Metal-bellows packless expansion joints.
3. Rubber packless expansion joints.
4. Grooved-joint expansion joints.
5. Pipe loops and swing connections.
6. Alignment guides and anchors.

1.3 PERFORMANCE REQUIREMENTS

A. Compatibility: Products shall be suitable for piping service fluids, materials, working pressures, and temperatures.

B. Capability: Products to absorb 200 percent of maximum axial movement between anchors.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. ASME Boiler and Pressure Vessel Code: Section IX.

PART 2 - PRODUCTS

2.1 PACKLESS EXPANSION JOINTS

A. Flexible-Hose Packless Expansion Joints:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Flex Pression Ltd.

b. Flex-Hose Co., Inc.
c. Flexicraft Industries.
d. Mason Industries, Inc.
e. Metraflex Company (The).
f. Unisource Manufacturing, Inc.

2. Description: Manufactured assembly with inlet and outlet elbow fittings and two flexible-metal-hose legs joined by long-radius, 180-degree return bend or center section of flexible hose.

3. Flexible Hose: Corrugated-metal inner hoses and braided outer sheaths.

4. Expansion Joints for Copper Tubing NPS 2 (DN 50) and Smaller: Copper-alloy fittings with solder-joint end connections.

   a. Bronze hoses and single-braid bronze sheaths with 450 psig at 70 deg F (3100 kPa at 21 deg C) and 340 psig at 450 deg F (2340 kPa at 232 deg C) ratings.
   b. Bronze hoses and double-braid bronze sheaths with 700 psig at 70 deg F (4830 kPa at 21 deg C) and 500 psig at 450 deg F (3450 kPa at 232 deg C) ratings.

5. Expansion Joints for Copper Tubing NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Copper-alloy fittings with threaded end connections.

   a. Stainless-steel hoses and single-braid, stainless-steel sheaths with 300 psig at 70 deg F (2070 kPa at 21 deg C) and 225 psig at 450 deg F (1550 kPa at 232 deg C) ratings.
   b. Stainless-steel hoses and double-braid, stainless-steel sheaths with 420 psig at 70 deg F (2890 kPa at 21 deg C) and 315 psig at 450 deg F (2170 kPa at 232 deg C) ratings.

6. Expansion Joints for Steel Piping NPS 2-1/2 to NPS 6 (DN 65 to DN 150): Stainless-steel fittings with flanged end connections.

   a. Stainless-steel hoses and single-braid, stainless-steel sheaths with 200 psig at 70 deg F (1380 kPa at 21 deg C) and 145 psig at 600 deg F (1000 kPa at 315 deg C) ratings.
   b. Stainless-steel hoses and double-braid, stainless-steel sheaths with 275 psig at 70 deg F (1900 kPa at 21 deg C) and 200 psig at 600 deg F (1380 kPa at 315 deg C) ratings.

7. Expansion Joints for Steel Piping NPS 8 to NPS 12 (DN 200 to DN 300): Stainless-steel fittings with flanged end connections.

   a. Stainless-steel hoses and single-braid, stainless-steel sheaths with 125 psig at 70 deg F (860 kPa at 21 deg C) and 90 psig at 600 deg F (625 kPa at 315 deg C) ratings.
   b. Stainless-steel hoses and double-braid, stainless-steel sheaths with 165 psig at 70 deg F (1130 kPa at 21 deg C) and 120 psig at 600 deg F (830 kPa at 315 deg C) ratings.

B. Metal-Bellows Packless Expansion Joints:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Adsco Manufacturing LLC.
b. American BOA, Inc.
c. Badger Industries, Inc.
d. Expansion Joint Systems, Inc.
e. Flex Pression Ltd.
f. Flex-Hose Co., Inc.
g. Flex-Weld, Inc.

2. Standards: ASTM F 1120 and EJMA's "Standards of the Expansion Joint Manufacturers Association, Inc."
3. Type: Circular, corrugated bellows with external tie rods.
4. Minimum Pressure Rating: 175 psig (1200 kPa) unless otherwise indicated.
5. Configuration: Single joint class(es) unless otherwise indicated.
6. Expansion Joints for Copper Tubing: Single-ply phosphor-bronze bellows, copper pipe ends, and brass shrouds.

a. End Connections for Copper Tubing NPS 2 (DN 50) and Smaller: Solder joint.
b. End Connections for Copper Tubing NPS 2-1/2 to NPS 4 (DN 65 to DN 100): Solder joint.
c. End Connections for Copper Tubing NPS 5 (DN 125) and Larger: Flanged.

C. Rubber Packless Expansion Joints:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Amber/Booth Company, Inc.
b. Flex-Hose Co., Inc.
c. Flex-Weld, Inc.
d. Flexicraft Industries.

2. Standards: ASTM F 1123 and FSA's "Technical Handbook: Non-Metallic Expansion Joints and Flexible Pipe Connectors."
3. Material: Fabric-reinforced rubber complying with FSA-NMEJ-703.
4. Arch Type: Single or multiple arches with external control rods.
5. Spherical Type: Single or multiple spheres with external control rods.
6. Minimum Pressure Rating for NPS 1-1/2 to NPS 4 (DN 40 to DN 100): 150 psig (1035 kPa) at 220 deg F (104 deg C).
7. Minimum Pressure Rating for NPS 5 and NPS 6 (DN 125 and DN 150): 140 psig (966 kPa) at 200 deg F (93 deg C).
8. Minimum Pressure Rating for NPS 8 to NPS 12 (DN 200 to DN 300): 140 psig (966 kPa) at 180 deg F (82 deg C).
9. Material for Fluids Containing Acids, Alkalies, or Chemicals: EPDM.
10. Material for Fluids Containing Gas, Hydrocarbons, or Oil: Buna-N.
11. Material for Water: BR.
12. End Connections: Full-faced, integral steel flanges with steel retaining rings.

2.2 GROOVED-JOINT EXPANSION JOINTS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Anvil International, Inc.
2. Shurjoint Piping Products.
3. Victaulic Company.

B. Description: Factory-assembled expansion joint made of several grooved-end pipe nipples, couplings, and grooved joints.

C. Standard: AWWA C606, for grooved joints.

D. Nipples: Galvanized, ASTM A 53/A 53M, Schedule 40, Type E or S, steel pipe with grooved ends.

E. Couplings: Five, flexible type for steel-pipe dimensions. Include ferrous housing sections, EPDM gasket suitable for cold and hot water, and bolts and nuts.

2.3 ALIGNMENT GUIDES AND ANCHORS

A. Alignment Guides:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Adsco Manufacturing LLC.
b. Advanced Thermal Systems, Inc.
c. Flex-Hose Co., Inc.
d. Flex-Weld, Inc.
e. Flexicraft Industries.

2. Description: Steel, factory-fabricated alignment guide, with bolted two-section outer cylinder and base for attaching to structure; with two-section guiding spider for bolting to pipe.

B. Anchor Materials:

1. Steel Shapes and Plates: ASTM A 36/A 36M.
2. Bolts and Nuts: ASME B18.10 or ASTM A 183, steel hex head.
3. Washers: ASTM F 844, steel, plain, flat washers.

4. Mechanical Fasteners: Insert-wedge-type stud with expansion plug anchor for use in hardened portland cement concrete, with tension and shear capacities appropriate for application.

a. Stud: Threaded, zinc-coated carbon steel.
b. Expansion Plug: Zinc-coated steel.
c. Washer and Nut: Zinc-coated steel.

5. Chemical Fasteners: Insert-type-stud, bonding-system anchor for use with hardened portland cement concrete, with tension and shear capacities appropriate for application.

a. Bonding Material: ASTM C 881/C 881M, Type IV, Grade 3, two-component epoxy resin suitable for surface temperature of hardened concrete where fastener is to be installed.
b. Stud: ASTM A 307, zinc-coated carbon steel with continuous thread on stud unless otherwise indicated.
c. Washer and Nut: Zinc-coated steel.

PART 3 - EXECUTION

3.1 EXPANSION-JOINT INSTALLATION

A. Install expansion joints of sizes matching sizes of piping in which they are installed.

B. Install metal-bellows expansion joints according to EJMA's "Standards of the Expansion Joint Manufacturers Association, Inc."

C. Install rubber packless expansion joints according to FSA-NMEJ-702.

D. Install grooved-joint expansion joints to grooved-end steel piping

3.2 PIPE LOOP AND SWING CONNECTION INSTALLATION

A. Install pipe loops cold-sprung in tension or compression as required to partly absorb tension or compression produced during anticipated change in temperature.

B. Connect risers and branch connections to mains with at least five pipe fittings including tee in main.

C. Connect risers and branch connections to terminal units with at least four pipe fittings including tee in riser.

D. Connect mains and branch connections to terminal units with at least four pipe fittings including tee in main.

3.3 ALIGNMENT-GUIDE AND ANCHOR INSTALLATION

A. Install alignment guides to guide expansion and to avoid end-loading and torsional stress.

B. Install one guide(s) on each side of pipe expansion fittings and loops. Install guides nearest to expansion joint not more than four pipe diameters from expansion joint.

C. Attach guides to pipe and secure guides to building structure.

D. Install anchors at locations to prevent stresses from exceeding those permitted by ASME B31.9 and to prevent transfer of loading and stresses to connected equipment.

E. Anchor Attachments:

1. Anchor Attachment to Black-Steel Pipe: Attach by welding. Comply with ASME B31.9 and ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."
2. Anchor Attachment to Galvanized-Steel Pipe: Attach with pipe hangers. Use MSS SP-69, Type 42, riser clamp welded to anchor.
3. Anchor Attachment to Copper Tubing: Attach with pipe hangers. Use MSS SP-69, Type 24, U-bolts bolted to anchor.

F. Fabricate and install steel anchors by welding steel shapes, plates, and bars. Comply with ASME B31.9 and AWS D1.1/D1.1M.

1. Anchor Attachment to Steel Structural Members: Attach by welding.
2. Anchor Attachment to Concrete Structural Members: Attach by fasteners. Follow fastener manufacturer's written instructions.

G. Use grout to form flat bearing surfaces for guides and anchors attached to concrete.

END OF SECTION 22 05 16

SECTION 22 05 18 - ESCUTCHEONS FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. All equipment, accessories, etc. shall comply with the Buy America Act. Sub-Contractor shall coordinate with General Contractor for specific requirements.

1.2 SUMMARY

A. Section Includes:

1. Escutcheons.
2. Floor plates.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 ESCUTCHEONS

A. One-Piece, Cast-Brass Type: With polished, chrome-plated finish and setscrew fastener.

B. One-Piece, Stamped-Steel Type: With chrome-plated finish and spring-clip fasteners.

C. Split-Casting Brass Type: With polished, chrome-plated finish and with concealed hinge and setscrew.

D. Split-Plate, Stamped-Steel Type: With chrome-plated finish, hinge, and spring-clip fasteners.

2.2 FLOOR PLATES

A. One-Piece Floor Plates: Cast-iron flange with holes for fasteners.

B. Split-Casting Floor Plates: Cast brass with concealed hinge.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install escutcheons for piping penetrations of walls, ceilings, and finished floors.(In Finished area's only)

B. Install escutcheons with ID to closely fit around pipe, tube, and insulation of insulated piping and with OD that completely covers opening.

C. Install floor plates for piping penetrations of equipment-room floors.

D. Install floor plates with ID to closely fit around pipe, tube, and insulation of piping and with OD that completely covers opening.

1. New Piping: One-piece, floor-plate type.

END OF SECTION 22 05 18

SECTION 22 05 19 - METERS AND GAGES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. All equipment, accessories, etc. shall comply with the Buy America Act. Sub-Contractor shall coordinate with General Contractor for specific requirements.

1.2 SUMMARY

A. Section Includes:

1. Bimetallic-actuated thermometers.
2. Filled-system thermometers.
3. Liquid-in-glass thermometers.
4. Thermowells.
5. Dial-type pressure gages.
6. Gage attachments.
7. Test plugs.
8. Test-plug kits.

B. Related Sections:

1. Section 21 "Facility Fire-Suppression Water-Service Piping" for fire-protection water-service meters outside the building.
2. Section 21 "Fire-Suppression Standpipes" for fire protection pressure gages.
3. Section 21 "Wet-Pipe Sprinkler Systems"
4. Section 21 "Dry-Pipe Sprinkler Systems" for fire protection pressure gages.
5. Section 22 "Facility Water Distribution Piping" for domestic water meters and combined domestic and fire-protection water-service meters outside the building.
6. Section 22 "Domestic Water Piping" for water meters inside the building.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of meter and gage, from manufacturer.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For meters and gages to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 BIMETALLIC-ACTUATED THERMOMETERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ashcroft Inc.
2. REOTEMP Instrument Corporation.
3. Trerice, H. O. Co.
4. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.

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B. Standard: ASME B40.200.

C. Case: Liquid-filled type(s); stainless steel with 5-inch nominal diameter.

D. Dial: Nonreflective aluminum with permanently etched scale markings and scales in deg F and deg C.

E. Connector Type(s): Union joint, adjustable angle, with unified-inch screw threads.

F. Connector Size: 1/2 inch, with ASME B1.1 screw threads.

G. Stem: 0.25 or 0.375 inch in diameter; stainless steel.

H. Window: Plain glass.

I. Ring: Stainless steel.

J. Element: Bimetal coil.

K. Pointer: Dark-colored metal.

L. Accuracy: Plus or minus 1 percent of scale range.

2.2 FILLED-SYSTEM THERMOMETERS

A. Direct-Mounted, Metal-Case, Vapor-Actuated Thermometers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Ashcroft Inc.
b. REOTEMP Instrument Corporation.
c. Trerice, H. O. Co.
d. Weiss Instruments, Inc.

2. Standard: ASME B40.200.

3. Case: Sealed type, cast aluminum or drawn steel5-inch nominal diameter.
4. Element: Bourdon tube or other type of pressure element.
5. Movement: Mechanical, with link to pressure element and connection to pointer.
6. Dial: Nonreflective aluminum with permanently etched scale markings graduated in deg F and deg C.
7. Pointer: Dark-colored metal.
8. Window: Glass.
9. Ring: Stainless steel.
10. Connector Type(s): Union joint, adjustable, 180 degrees in vertical plane, 360 degrees in horizontal plane, with locking device rigid, backrigid, bottom; with ASME B1.1 screw threads.
11. Thermal System: Liquid-filled bulb in copper-plated steel, aluminum, or brass stem and of length to suit installation.
    a. Design for Thermowell Installation: Bare stem.
12. Accuracy: Plus or minus 1 percent of scale range.

2.3 LIQUID-IN-GLASS THERMOMETERS

A. Metal-Case, Compact-Style, Liquid-in-Glass Thermometers:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    a. Trerice, H. O. Co.
    b. REOTEMP Instrument Corporation.
    c. Weiss Instruments, Inc.
    d. WIKA Insturment Corporation-USA.
2. Standard: ASME B40.200.
3. Case: Cast aluminum; 6-inch nominal size.
4. Case Form: Back angle or Straight unless otherwise indicated.
5. Tube: Glass with magnifying lens and blue or red organic liquid.
6. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F and deg C.
7. Window: Glass.
8. Stem: Aluminum or brass and of length to suit installation.
    a. Design for Thermowell Installation: Bare stem.
9. Connector: 3/4 inch, with ASME B1.1 screw threads.
10. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.4 THERMOWELLS

A. Thermowells:

1. Standard: ASME B40.200.
2. Description: Pressure-tight, socket-type fitting made for insertion into piping tee fitting.
3. Material for Use with Copper Tubing: CNR.
4. Material for Use with Steel Piping: CRES.
5. Type: Stepped shank unless straight or tapered shank is indicated.
6. External Threads: NPS 1/2, NPS 3/4, or NPS 1 ASME B1.20.1 pipe threads.
7. Internal Threads: 1/2, 3/4, and 1 inch, with ASME B1.1 screw threads.
8. Bore: Diameter required to match thermometer bulb or stem.
9. Insertion Length: Length required to match thermometer bulb or stem.
10. Lagging Extension: Include on thermowells for insulated piping and tubing.
11. Bushings: For converting size of thermowell's internal screw thread to size of thermometer connection.

B. Heat-Transfer Medium: Mixture of graphite and glycerin.

2.5 PRESSURE GAGES

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Ashcroft Inc.
   b. REOTEMP Instrument Corporation.
   c. Trerice, H. O. Co.
   d. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
   e. Weiss Instruments, Inc.
2. Standard: ASME B40.100.
3. Case: Liquid-filled type(s); cast aluminum or drawn steel4-1/2-inch nominal diameter.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.
8. Pointer: Dark-colored metal.

9. Window: Glass.
10. Ring: Brass or Stainless steel.
11. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

2.6 GAGE ATTACHMENTS

A. Snubbers: ASME B40.100, brass; NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads and piston-type surge-dampening device. Include extension for use on insulated piping.

B. Valves: Brass or stainless-steel needle], with NPS 1/4 or NPS 1/2, ASME B1.20.1 pipe threads.

2.7 TEST PLUGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flow Design, Inc.
2. National Meter, Inc.
3. Peterson Equipment Co., Inc.
4. Trerice, H. O. Co.
5. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
6. Weiss Instruments, Inc.

B. Description: Test-station fitting made for insertion into piping tee fitting.

C. Body: Brass or stainless steel with core inserts and gasketed and threaded cap. Include extended stem on units to be installed in insulated piping.

D. Thread Size: NPS 1/4 orNPS 1/2, ASME B1.20.1 pipe thread.

E. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F.

F. Core Inserts: Chlorosulfonated polyethylene synthetic self-sealing rubber.

2.8 TEST-PLUG KITS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flow Design, Inc.
2. National Meter, Inc.
3. Peterson Equipment Co., Inc.
4. Trerice, H. O. Co.
5. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
6. Weiss Instruments, Inc.

B. Furnish one test-plug kit(s) containing one thermometer(s), one pressure gage and adapter, and carrying case. Thermometer sensing elements, pressure gage, and adapter probes shall be of diameter to fit test plugs and of length to project into piping.

C. Low-Range Thermometer: Small, bimetallic insertion type with 1- to 2-inch- diameter dial and tapered-end sensing element. Dial range shall be at least 25 to 125 deg F .

D. High-Range Thermometer: Small, bimetallic insertion type with1- to 2-inch- diameter dial and tapered-end sensing element. Dial range shall be at least 0 to 220 deg F.

E. Pressure Gage: Small, Bourdon-tube insertion type with 2- to 3-inch- (diameter dial and probe. Dial range shall be at least 0 to 200 psig.

F. Carrying Case: Metal or plastic, with formed instrument padding.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install thermowells with socket extending to center of pipe and in vertical position in piping tees.

B. Install thermowells of sizes required to match thermometer connectors. Include bushings if required to match sizes.

C. Install thermowells with extension on insulated piping.

D. Fill thermowells with heat-transfer medium.

E. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.

F. Install valve and snubber in piping for each pressure gage for fluids.

G. Install test plugs in piping tees.

H. Install thermometers in the following locations (May not be shown on drawings):

1. Inlet and outlet of each water heater.
2. Inlets and outlets of each domestic water heat exchanger.
3. Inlet and outlet of each domestic hot-water storage tank.
4. Outlet of all master mixing valves.

I. Install pressure gages in the following locations(May not be shown on drawings):

1. Building water service entrance into building.
2. Inlet and outlet of each pressure-reducing valve.
3. Suction and discharge of each domestic water pump.

3.2 CONNECTIONS

A. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.

3.3 ADJUSTING

A. Adjust faces of meters and gages to proper angle for best visibility.

3.4 THERMOMETER SCALE-RANGE SCHEDULE

A. Scale Range for Domestic Cold-Water Piping: 0 to 100 deg F.

B. Scale Range for Domestic Hot-Water Piping: 0 to 250 deg F.

3.5 PRESSURE-GAGE SCALE-RANGE SCHEDULE

A. Scale Range for Water Service Piping: 0 to 160 psi.

B. Scale Range for Domestic Water Piping: 0 to 200 psi.

END OF SECTION 22 05 19

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SECTION 22 05 23 - GENERAL-DUTY VALVES FOR PLUMBING PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. All equipment, accessories, etc. shall comply with the Buy America Act. Sub-Contractor shall coordinate with General Contractor for specific requirements.

1.2 SUMMARY

A. Section Includes:

1. Bronze angle valves.
2. Brass ball valves.
3. Bronze ball valves.
4. Bronze lift check valves.
5. Bronze swing check valves.
6. Bronze gate valves.

B. Related Sections:

1. Section 22 "Identification for Plumbing Piping and Equipment" for valve tags and schedules.
2. Section 22 "Domestic Water Piping" for valves applicable only to this piping.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene copolymer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

D. NRS: Nonrising stem.

E. OS&Y: Outside screw and yoke.

F. RS: Rising stem.

G. SWP: Steam working pressure.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of valve indicated.

1.5 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.

C. NSF Compliance: NSF 61 for valve materials for potable-water service.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Use the following precautions during storage:

1. Maintain valve end protection.

2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

B. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Valve Actuator Types:

1. Gear Actuator: For quarter-turn valves NPS 8 and larger.

2. Handlever: For quarter-turn valves NPS 6 and smaller except plug valves.

3. Wrench: For plug valves with square heads. Furnish Owner with 1 wrench for every 10 plug valves, for each size square plug-valve head.

4. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator; of size and with chain for mounting height, as indicated in the "Valve Installation" Article.

E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:

1. Gate Valves: With rising stem.

2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.

F. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.

2. Grooved: With grooves according to AWWA C606.

3. Solder Joint: With sockets according to ASME B16.18.
4. Threaded: With threads according to ASME B1.20.1.

G. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE BALL VALVES

A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Conbraco Industries, Inc.; Apollo Valves.
   b. Crane Co.; Crane Valve Group; Crane Valves.
   c. Hammond Valve.
   d. Milwaukee Valve Company.
   e. NIBCO INC.
2. Description:
   a. Standard: MSS SP-110.
   b. SWP Rating: 150 psig.
   c. CWP Rating: 600 psig.
   d. Body Design: Two piece.
   e. Body Material: Bronze.
   f. Ends: Threaded.
   g. Seats: PTFE or TFE.
   h. Stem: Bronze.
   i. Ball: Chrome-plated brass.
   j. Port: Full.

2.3 BRONZE LIFT CHECK VALVES

A. Class 125, Lift Check Valves with Nonmetallic Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Hammond Valve.
   b. Kitz Corporation.
   c. Milwaukee Valve Company.
   d. NIBCO INC.
2. Description:
   a. Standard: MSS SP-80, Type 2.

b. CWP Rating: 200 psig.

c. Body Design: Vertical flow.

d. Body Material: ASTM B 61 or ASTM B 62, bronze.

e. Ends: Threaded.

f. Disc: NBR, PTFE, or TFE.

2.4 BRONZE SWING CHECK VALVES

A. Class 250, Iron Swing Check Valves with Metal Seats:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.; Crane Valve Group; Stockham Division.

b. Hammond Valve.

c. Milwaukee Valve Company.

d. NIBCO INC.

2. Description:

a. Standard: MSS SP-71, Type I.

b. CWP Rating: 500 psig.

c. Body Design: Clear or full waterway.

d. Body Material: ASTM A 126, gray iron with bolted bonnet.

e. Ends: Flanged.

f. Trim: Bronze.

g. Gasket: Asbestos free.

B. Class 150, NRS Bronze Gate Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Hammond Valve.

b. Kitz Corporation.

c. Milwaukee Valve Company.

d. NIBCO INC.

2. Description:

a. Standard: MSS SP-80, Type 1.

b. CWP Rating: 300 psig.

c. Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.

d. Ends: Threaded.

e. Stem: Bronze.

f. Disc: Solid wedge; bronze.

g. Packing: Asbestos free.

h. Handwheel: Malleable iron, bronze, or aluminum.

2.5 IRON GATE VALVES

A. Class 125, NRS, Iron Gate Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.; Crane Valve Group; Stockham Division.

b. Hammond Valve.

c. Kitz Corporation.

d. Milwaukee Valve Company.

e. NIBCO INC.

2. Description:

a. Standard: MSS SP-70, Type I.

b. CWP Rating: 200 psig.

c. Body Material: ASTM A 126, gray iron with bolted bonnet.

d. Ends: Flanged.

e. Trim: Bronze.

f. Disc: Solid wedge.

g. Packing and Gasket: Asbestos free.

B. Class 250, NRS, Iron Gate Valves:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.

b. Crane Co.; Crane Valve Group; Stockham Division.

c. NIBCO INC.

2. Description:

a. Standard: MSS SP-70, Type I.

b. CWP Rating: 500 psig.

c. Body Material: ASTM A 126, gray iron with bolted bonnet.

d. Ends: Flanged.

e. Trim: Bronze.

f. Disc: Solid wedge.

g. Packing and Gasket: Asbestos free.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown.

B. Locate valves for easy access and provide separate support where necessary.

C. Install valves in horizontal piping with stem at or above center of pipe.

D. Install valves in position to allow full stem movement.

E. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level.

2. Lift Check Valves: With stem upright and plumb.

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball or gate valves.

2. Pump-Discharge Check Valves:

a. NPS 2 and Smaller: Bronze swing check valves with bronze or nonmetallic disc.

b. NPS 2-1/2 and Larger for Domestic Water: Iron swing check valves with lever and weight or with spring or iron-seat check valves.

c. NPS 2-1/2 and Larger for Sanitary Waste and Storm Drainage: Iron swing check valves with lever and weight or spring.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

C. Select valves, except wafer types, with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends except where solder-joint valve-end option is indicated in valve schedules below.

2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.

3. For Steel Piping, NPS 2 and Smaller: Threaded ends.

4. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends except where threaded valve-end option is indicated in valve schedules below.

5. For Grooved-End Copper Tubing and Steel Piping: Valve ends may be grooved.

3.5 DOMESTIC, HOT- AND COLD-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Bronze and Brass Valves: May be provided with solder-joint ends instead of threaded ends.

2. Ball Valves: Two piece, full port, brass or bronze with brass trim.

3. Bronze Swing Check Valves: Class 150,bronze disc.

4. Bronze Gate Valves: Class 150, NRS.

B. Pipe NPS 2-1/2 and Larger:

1. Iron Valves, NPS 2-1/2 to NPS 4: May be provided with threaded ends instead of flanged ends.

2. Iron Ball Valves: Class 150.

3. Iron Swing Check Valves: Class 125nonmetallic-to-metal seats.

4. Iron Gate Valves: Class 125NRS.

3.6 STORM-DRAINAGE VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Bronze Valves: May be provided with solder-joint ends instead of threaded ends.

2. Ball Valves: Two piece,full port, bronze] withbronze trim.

3. Bronze Swing Check Valves: Class 125nonmetallic disc.

4. Bronze Gate Valves: Class 150, NRS.

B. Pipe NPS 2-1/2 and Larger:

1. Iron Valves, NPS 2-1/2 to NPS 4: May be provided with threaded ends instead of flanged ends.

2. Iron Ball Valves: Class 150.
3. Iron Swing Check Valves: Class 125,nonmetallic-to-metal seats.
4. Iron Gate Valves: Class 125, NRS.

END OF SECTION 22 05 23

SECTION 22 05 29 - HANGERS AND SUPPORTS FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. All equipment, accessories, etc. shall comply with the Buy America Act. Sub-Contractor shall coordinate with General Contractor for specific requirements.

1.2 SUMMARY

A. Section Includes:

1. Metal pipe hangers and supports.
2. Trapeze pipe hangers.
3. Metal framing systems.
4. Thermal-hanger shield inserts.
5. Fastener systems.
6. Pipe stands.
7. Pipe positioning systems.
8. Equipment supports.

B. Related Sections:

1. Section 05 "Metal Fabrications" for structural-steel shapes and plates for trapeze hangers for pipe and equipment supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society of the Valve and Fittings Industry Inc.

1.4 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports for plumbing piping and equipment shall withstand the effects of gravity loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.

1. Design supports for multiple pipes, including pipe stands, capable of supporting combined weight of supported systems, system contents, and test water.
2. Design equipment supports capable of supporting combined operating weight of supported equipment and connected systems and components.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Show fabrication and installation details and include calculations for the following; include Product Data for components:

1. Trapeze pipe hangers.
2. Metal framing systems.
3. Fiberglass strut systems.
4. Pipe stands.
5. Equipment supports.

1.6 INFORMATIONAL SUBMITTALS

A. Welding certificates.

1.7 QUALITY ASSURANCE

A. Structural Steel Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Pipe Welding Qualifications: Qualify procedures and operators according to ASME Boiler and Pressure Vessel Code.

PART 2 - PRODUCTS

2.1 METAL PIPE HANGERS AND SUPPORTS

A. Carbon-Steel Pipe Hangers and Supports:

1. Description: MSS SP-58, Types 1 through 58, factory-fabricated components.
2. Galvanized Metallic Coatings: Pregalvanized or hot dipped.
3. Nonmetallic Coatings: Plastic coating, jacket, or liner.
4. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion to support bearing surface of piping.
5. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

2.2 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural carbon-steel shapes with MSS SP-58 carbon-steel hanger rods, nuts, saddles, and U-bolts.

2.3 METAL FRAMING SYSTEMS

A. MFMA Manufacturer Metal Framing Systems:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Allied Tube & Conduit.
   b. Cooper B-Line, Inc.

c. Unistrut Corporation; Tyco International, Ltd.

2. Description: Shop- or field-fabricated pipe-support assembly for supporting multiple parallel pipes.

3. Standard: MFMA-4.

4. Channels: Continuous slotted steel channel with inturned lips.

5. Channel Nuts: Formed or stamped steel nuts or other devices designed to fit into channel slot and, when tightened, prevent slipping along channel.

6. Hanger Rods: Continuous-thread rod, nuts, and washer made of carbon steel.

7. Metallic Coating: Hot-dipped galvanized.

8. Plastic Coating: Polyurethane.

2.4 THERMAL-HANGER SHIELD INSERTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. ERICO International Corporation.

2. PHS Industries, Inc.

3. Pipe Shields, Inc.; a subsidiary of Piping Technology & Products, Inc.

4. Rilco Manufacturing Co., Inc.

5. Value Engineered Products, Inc.

B. Insulation-Insert Material for Cold Piping: ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength and vapor barrier.

C. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with 100-psig ASTM C 552, Type II cellular glass with 100-psig or ASTM C 591, Type VI, Grade 1 polyisocyanurate with 125-psig minimum compressive strength.

D. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

E. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

F. Insert Length: Extend 2 inches (50 mm) beyond sheet metal shield for piping operating below ambient air temperature.

2.5 FASTENER SYSTEMS

A. Powder-Actuated Fasteners Powder-actuated fasteners are not acceptable.

B. Mechanical-Expansion Anchors: Insert-wedge-type,stainless- steel anchors, for use in hardened portland cement concrete; with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

2.6 PIPE STANDS

A. General Requirements for Pipe Stands: Shop- or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. Compact Pipe Stand: One-piece plastic unit with integral-rod roller, pipe clamps, or V-shaped cradle to support pipe, for roof installation without membrane penetration.

C. Low-Type, Single-Pipe Stand: One-piece plastic or stainless-steel base unit with plastic roller, for roof installation without membrane penetration.

D. High-Type, Single-Pipe Stand:

1. Description: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.

2. Base: Stainless steel.

3. Vertical Members: Two or more stainless-steel, continuous-thread rods.

4. Horizontal Member: stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

E. High-Type, Multiple-Pipe Stand:

1. Description: Assembly of bases, vertical and horizontal members, and pipe supports, for roof installation without membrane penetration.

2. Bases: One or more; plastic.

3. Vertical Members: Two or more protective-coated-steel channels.

4. Horizontal Member: Protective-coated-steel channel.

5. Pipe Supports: Galvanized-steel, clevis-type pipe hangers.

F. Curb-Mounting-Type Pipe Stands: Shop- or field-fabricated pipe supports made from structural-steel shapes, continuous-thread rods, and rollers, for mounting on permanent stationary roof curb.

2.7 PIPE POSITIONING SYSTEMS

A. Description: IAPMO PS 42, positioning system of metal brackets, clips, and straps for positioning piping in pipe spaces; for plumbing fixtures in commercial applications.

2.8 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural carbon-steel shapes.

2.9 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, carbon-steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.

2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT INSTALLATION

A. Metal Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from the building structure.

B. Metal Trapeze Pipe-Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping, and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified for individual pipe hangers.

2. Field fabricate from ASTM A 36/A 36M, carbon-steel shapes selected for loads being supported. Weld steel according to AWS D1.1/D1.1M.

C. Metal Framing System Installation: Arrange for grouping of parallel runs of piping, and support together on field-assembled metal framing systems.

D. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

E. Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounted Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.

2. Curb-Mounted-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. See Section 077200 "Roof Accessories" for curbs.

F. Pipe Positioning-System Installation: Install support devices to make rigid supply and waste piping connections to each plumbing fixture.

G. Install hangers and supports complete with necessary attachments, inserts, bolts, rods, nuts, washers, and other accessories.

H. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

I. Install hangers and supports to allow controlled thermal movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

J. Install lateral bracing with pipe hangers and supports to prevent swaying.

K. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

L. Load Distribution: Install hangers and supports so that piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

M. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and to not exceed maximum pipe deflections allowed by ASME B31.9 for building services piping.

N. Insulated Piping:

1. Attach clamps and spacers to piping.

   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.

   b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.

   c. Do not exceed pipe stress limits allowed by ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

   a. NPS 1/4 to NPS 3-1/2 : 12 inches long and 0.048 inch thick.

   b. NPS 4 : 12 inches long and 0.06 inch thick.

   c. NPS 5 and NPS 6 : 18 inches long and 0.06 inch thick.

   d. NPS 8 to NPS 14 : 24 inches long and 0.075 inch thick.

   e. NPS 16 to NPS 24 : 24 inches long and 0.105 inch thick.

5. Pipes NPS 8 and Larger: Include wood or reinforced calcium-silicate-insulation inserts of length at least as long as protective shield.

6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.2 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make bearing surface smooth.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.3 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1/D1.1M procedures for shielded, metal arc welding; appearance and quality of welds; and methods used in correcting welding work; and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and so contours of welded surfaces match adjacent contours.

3.4 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches .

3.5 PAINTING

A. Touchup: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide a minimum dry film thickness of 2.0 mils.

B. Touchup: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Section 099113 "Exterior Painting."

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

3.6 HANGER AND SUPPORT SCHEDULE

A. Specific hanger and support requirements are in Sections specifying piping systems and equipment.

B. Comply with MSS SP-69 for pipe-hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use carbon-steel pipe hangers and supports metal trapeze pipe hangers and metal framing systems and attachments for general service applications.

F. Use stainless-steel pipe hangers attachments for hostile environment applications.(Under track piping)

G. Use copper-plated pipe hangers and copper attachments for copper piping and tubing.

H. Use padded hangers for piping that is subject to scratching.

I. Use thermal-hanger shield inserts for insulated piping and tubing.

J. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated, stationary pipes NPS 1/2 to NPS 30.

2. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes NPS 1/2 to NPS 24 if little or no insulation is required.

3. Adjustable, Swivel-Ring Band Hangers (MSS Type 10): For suspension of noninsulated, stationary pipes NPS 1/2 to NPS 8.

4. Pipe Saddle Supports (MSS Type 36): For support of pipes NPS 4 to NPS 36, with steel-pipe base stanchion support and cast-iron floor flange or carbon-steel plate.

5. Adjustable Pipe Saddle Supports (MSS Type 38): For stanchion-type support for pipes NPS 2-1/2 to NPS 36 if vertical adjustment is required, with steel-pipe base stanchion support and cast-iron floor flange.

K. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers NPS 3/4 to NPS 24.

L. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.

2. Swivel Turnbuckles (MSS Type 15): For use with MSS Type 11, split pipe rings.

M. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel or Malleable Concrete Inserts (MSS Type 18): For upper attachment to suspend pipe hangers from concrete ceiling.

2. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction, to attach to top flange of structural shape.

3. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.

4. Center-Beam Clamps (MSS Type 21): For attaching to center of bottom flange of beams.

5. Welded Beam Attachments (MSS Type 22): For attaching to bottom of beams if loads are considerable and rod sizes are large.

6. Top-Beam Clamps (MSS Type 25): For top of beams if hanger rod is required tangent to flange edge.

7. Welded-Steel Brackets: For support of pipes from below or for suspending from above by using clip and rod. Use one of the following for indicated loads:

   a. Light (MSS Type 31): 750 lb.

   b. Medium (MSS Type 32): 1500 lb.

   c. Heavy (MSS Type 33): 3000 lb.

N. Comply with MSS SP-69 for trapeze pipe-hanger selections and applications that are not specified in piping system Sections.

O. Comply with MFMA-103 for metal framing system selections and applications that are not specified in piping system Sections.

P. Use mechanical-expansion anchors instead of building attachments where required in concrete construction.

Q. Use pipe positioning systems in pipe spaces behind plumbing fixtures to support supply and waste piping for plumbing fixtures.

END OF SECTION 22 05 29

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SECTION 22 05 53 - IDENTIFICATION FOR PLUMBING PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. All equipment, accessories, etc. shall comply with the Buy America Act. Sub-Contractor shall coordinate with General Contractor for specific requirements.

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Pipe labels.
3. Valve tags.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Plastic Labels for Equipment:

1. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.
2. Letter Color: White.
3. Background Color: Black.
4. Maximum Temperature: Able to withstand temperatures up to 160 deg F.
5. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

6. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

7. Fasteners: Stainless-steel rivets or self-tapping screws.

8. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to partially cover circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions, or as separate unit on each pipe label to indicate flow direction.

2. Lettering Size: At least 1-1/2 inches high.

2.3 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Brass, 0.032-inch or Stainless steel, 0.025-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.

2. Fasteners: Brass wire-link or beaded chain or S-hook.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

3.3 PIPE LABEL INSTALLATION

A. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.

2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.

3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.

4. At access doors, manholes, and similar access points that permit view of concealed piping.

5. Near major equipment items and other points of origination and termination.

6. Spaced at maximum intervals of 25 feet along each run. Reduce intervals to 10 feet in areas of congested piping and equipment.

7. Identification of potable and non-potable water.(irrigation water)

a. In all buildings where two or more water distribution system, one potable water and the other non-potable water, are installed, each system shall be identified either by color marking or metal tags as required by ASME A13.1. Reclaimed water systems shall be identified using color coded Pantone Purple 522C and marked with the statement “NONPOTABLE WATER - NOT FOR HUMAN CONSUMPTION.

B. Pipe Label Color: Refer to ASME (ANSI) Standard A13.1-2007.

3.4 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

a. Cold Water: 2 inches, round.

b. Hot Water: 2 inches, round.

END OF SECTION 22 05 53

SECTION 22 07 19 - PLUMBING PIPING INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. All equipment, accessories, etc. shall comply with the Buy America Act. Sub-Contractor shall coordinate with General Contractor for specific requirements.

1.2 SUMMARY

A. Section includes insulating the following plumbing piping services:

1. Domestic hot-water piping.
2. Domestic recirculating hot-water piping.
3. Roof drains and rainwater leaders. Horizontal piping and roof drain body.
4. Supplies and drains for handicap-accessible lavatories and sinks.

B. Related Sections:

1. Division 22 Section "Plumbing Equipment Insulation."

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied, if any).

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.
2. Detail attachment and covering of heat tracing inside insulation.
3. Detail insulation application at pipe expansion joints for each type of insulation.
4. Detail insulation application at elbows, fittings, flanges, valves, and specialties for each type of insulation.
5. Detail removable insulation at piping specialties, equipment connections, and access panels.
6. Detail application of field-applied jackets.
7. Detail application at linkages of control devices.

C. Samples: For each type of insulation and jacket indicated. Identify each Sample, describing product and intended use. Sample sizes are as follows:

1. Preformed Pipe Insulation Materials: 12 inches (300 mm) long by NPS 2 (DN 50).
2. Jacket Materials for Pipe: 12 inches (300 mm) long by NPS 2 (DN 50).

3. Sheet Jacket Materials: 12 inches (300 mm) square.

4. Manufacturer's Color Charts: For products where color is specified, show the full range of colors available for each type of finish material.

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified Installer.

B. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

C. Field quality-control reports.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Surface-Burning Characteristics: For insulation and related materials, as determined by testing identical products according to ASTM E 84 by a testing agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.

2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

C. Mockups: Before installing insulation, build mockups for each type of insulation and finish listed below to demonstrate quality of insulation application and finishes. Build mockups in the location indicated or, if not indicated, as directed by Architect. Use materials indicated for the completed Work.

1. Piping Mockups:

a. One 10-foot (3-m) section of NPS 2 (DN 50) straight pipe.

b. One each of a 90-degree threaded, welded, and flanged elbow.

c. One each of a threaded, welded, and flanged tee fitting.

d. One NPS 2 (DN 50) or smaller valve, and one NPS 2-1/2 (DN 65) or larger valve.

e. Four support hangers including hanger shield and insert.

f. One threaded strainer and one flanged strainer with removable portion of insulation.

g. One threaded reducer and one welded reducer.

h. One pressure temperature tap.

i. One mechanical coupling.

2. For each mockup, fabricate cutaway sections to allow observation of application details for insulation materials, adhesives, mastics, attachments, and jackets.
3. Notify Architect seven days in advance of dates and times when mockups will be constructed.
4. Obtain Architect's approval of mockups before starting insulation application.
5. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed.

D. Comply with the following applicable standards and other requirements specified for miscellaneous components:

1. Supply and Drain Protective Shielding Guards: ICC A117.1.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.7 COORDINATION

A. Coordinate sizes and locations of supports, hangers, and insulation shields specified in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application. Before preparing piping Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

C. Coordinate installation and testing of heat tracing.

1.8 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in "Piping Insulation Schedule, General," "Indoor Piping Insulation Schedule," "Outdoor, Aboveground Piping Insulation Schedule," and "Outdoor, Underground Piping Insulation Schedule" articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Pittsburgh Corning Corporation; Foamglas.

2. Block Insulation: ASTM C 552, Type I.

3. Special-Shaped Insulation: ASTM C 552, Type III.

4. Preformed Pipe Insulation without Jacket: Comply with ASTM C 552, Type II, Class 1.

5. Preformed Pipe Insulation with Factory-Applied ASJ: Comply with ASTM C 552, Type II, Class 2.

6. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.

G. Flexible Elastomeric Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Aeroflex USA, Inc.; Aerocel.

b. Armacell LLC; AP Armaflex.

c. K-Flex USA; Insul-Lock, Insul-Tube, and K-FLEX LS.

H. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CertainTeed Corp.; SoftTouch Duct Wrap.

b. Johns Manville; Microlite.

c. Knauf Insulation; Friendly Feel Duct Wrap.

d. Manson Insulation Inc.; Alley Wrap.

e. Owens Corning; SOFTR All-Service Duct Wrap.

I. Mineral-Fiber, Preformed Pipe Insulation:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Fibrex Insulations Inc.; Coreplus 1200.

b. Johns Manville; Micro-Lok.

c. Knauf Insulation; 1000-Degree Pipe Insulation.

d. Manson Insulation Inc.; Alley-K.

e. Owens Corning; Fiberglas Pipe Insulation.

2. Type I, 850 Deg F (454 Deg C) Materials: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 547, Type I, Grade A, with factory-applied ASJ. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

J. Phenolic:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Kingspan Tarec Industrial Insulation NV; Koolphen K.

b. Resolco International BV; Insul-phen.

2. Preformed pipe insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type III, Grade 1.

3. Block insulation of rigid, expanded, closed-cell structure. Comply with ASTM C 1126, Type II, Grade 1.

4. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.

5. Factory-Applied Jacket: ASJ. Requirements are specified in "Factory-Applied Jackets" Article.

K. Polyolefin: Unicellular, polyethylene thermal plastic insulation. Comply with ASTM C 534 or ASTM C 1427, Type I, Grade 1 for tubular materials.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Armacell LLC; Tubolit.

b. Nomaco Insulation; IMCOLOCK and NOMALOCK.

2.2 INSULATING CEMENTS

A. Mineral-Fiber Insulating Cement: Comply with ASTM C 195.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Ramco Insulation, Inc.; Super-Stik.

B. Expanded or Exfoliated Vermiculite Insulating Cement: Comply with ASTM C 196.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Ramco Insulation, Inc.; Thermokote V.

C. Mineral-Fiber, Hydraulic-Setting Insulating and Finishing Cement: Comply with ASTM C 449.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Ramco Insulation, Inc.; Ramcote 1200 and Quik-Cote.

2.3 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Cellular-Glass Adhesive: Two-component, thermosetting urethane adhesive containing no flammable solvents, with a service temperature range of minus 100 to plus 200 deg F (minus 73 to plus 93 deg C).

1. Products: Subject to compliance with requirements, provide one of the following:

a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 81-84.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Flexible Elastomeric and Polyolefin Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Aeroflex USA, Inc.; Aeroseal.

b. Armacell LLC; Armaflex 520 Adhesive.

c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-75.

d. K-Flex USA; R-373 Contact Adhesive.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-127.

b. Eagle Bridges - Marathon Industries; 225.

c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-60/85-70.

d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Phenolic Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F (minus 59 to plus 149 deg C).

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-96.

b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 81-33.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

F. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-82.

b. Eagle Bridges - Marathon Industries; 225.

c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 85-20.

d. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

G. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Dow Corning Corporation; 739, Dow Silicone.

b. Johns Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.

c. P.I.C. Plastics, Inc.; Welding Adhesive.

d. Speedline Corporation; Polyco VP Adhesive.

2. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

3. Adhesive shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.4 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-PRF-19565C, Type II.

1. For indoor applications, use mastics that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Vapor-Barrier Mastic: Water based; suitable for indoor use on below-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-80/30-90.

b. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96/E 96M, Procedure B, 0.013 perm (0.009 metric perm) at 43-mil (1.09-mm) dry film thickness.

3. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).

4. Solids Content: ASTM D 1644, 58 percent by volume and 70 percent by weight.

5. Color: White.

C. Vapor-Barrier Mastic: Solvent based; suitable for indoor use on below-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-30.

b. Eagle Bridges - Marathon Industries; 501.

c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-35.

d. Mon-Eco Industries, Inc.; 55-10.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm (0.03 metric perm) at 35-mil (0.9-mm) dry film thickness.

3. Service Temperature Range: 0 to 180 deg F (Minus 18 to plus 82 deg C).

4. Solids Content: ASTM D 1644, 44 percent by volume and 62 percent by weight.

5. Color: White.

D. Vapor-Barrier Mastic: Solvent based; suitable for outdoor use on below-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Encacel.

b. Eagle Bridges - Marathon Industries; 570.

c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 60-95/60-96.

2. Water-Vapor Permeance: ASTM F 1249, 0.05 perm (0.033 metric perm) at 30-mil (0.8-mm) dry film thickness.

3. Service Temperature Range: Minus 50 to plus 220 deg F (Minus 46 to plus 104 deg C).

4. Solids Content: ASTM D 1644, 33 percent by volume and 46 percent by weight.

5. Color: White.

E. Breather Mastic: Water based; suitable for indoor and outdoor use on above-ambient services.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-10.

b. Eagle Bridges - Marathon Industries; 550.

c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 46-50.

d. Mon-Eco Industries, Inc.; 55-50.

e. Vimasco Corporation; WC-1/WC-5.

2. Water-Vapor Permeance: ASTM F 1249, 1.8 perms (1.2 metric perms) at 0.0625-inch (1.6-mm) dry film thickness.

3. Service Temperature Range: Minus 20 to plus 180 deg F (Minus 29 to plus 82 deg C).

4. Solids Content: 60 percent by volume and 66 percent by weight.

5. Color: White.

2.5 LAGGING ADHESIVES

A. Description: Comply with MIL-A-3316C, Class I, Grade A, and shall be compatible with insulation materials, jackets, and substrates.

1. For indoor applications, use lagging adhesives that have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-50 AHV2.

b. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-36.

c. Vimasco Corporation; 713 and 714.

3. Fire-resistant, water-based lagging adhesive and coating for use indoors to adhere fire-resistant lagging cloths over pipe insulation.

4. Service Temperature Range: 0 to plus 180 deg F (Minus 18 to plus 82 deg C).

5. Color: White.

2.6 SEALANTS

A. Joint Sealants:

1. Joint Sealants for Cellular-Glass and Phenolic Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.

b. Eagle Bridges - Marathon Industries; 405.

c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 30-45.

d. Mon-Eco Industries, Inc.; 44-05.

e. Pittsburgh Corning Corporation; Pittseal 444.

2. Materials shall be compatible with insulation materials, jackets, and substrates.

3. Permanently flexible, elastomeric sealant.

4. Service Temperature Range: Minus 100 to plus 300 deg F (Minus 73 to plus 149 deg C).

5. Color: White or gray.

6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

B. FSK and Metal Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.

b. Eagle Bridges - Marathon Industries; 405.

c. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; 95-44.

d. Mon-Eco Industries, Inc.; 44-05.

2. Materials shall be compatible with insulation materials, jackets, and substrates.

3. Fire- and water-resistant, flexible, elastomeric sealant.

4. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).

5. Color: Aluminum.

6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; CP-76.

2. Materials shall be compatible with insulation materials, jackets, and substrates.

3. Fire- and water-resistant, flexible, elastomeric sealant.

4. Service Temperature Range: Minus 40 to plus 250 deg F (Minus 40 to plus 121 deg C).

5. Color: White.

6. For indoor applications, sealants shall have a VOC content of 420 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

7. Sealants shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.7 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

2. ASJ-SSL: ASJ with self-sealing, pressure-sensitive, acrylic-based adhesive covered by a removable protective strip; complying with ASTM C 1136, Type I.

3. FSK Jacket: Aluminum-foil, fiberglass-reinforced scrim with kraft-paper backing; complying with ASTM C 1136, Type II.

2.8 FIELD-APPLIED FABRIC-REINFORCING MESH

A. Woven Glass-Fiber Fabric: Approximately 2 oz./sq. yd. (68 g/sq. m) with a thread count of 10 strands by 10 strands/sq. in. (4 strands by 4 strands/sq. mm) for covering pipe and pipe fittings.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Chil-Glas Number 10.

B. Woven Polyester Fabric: Approximately 1 oz./sq. yd. (34 g/sq. m) with a thread count of 10 strands by 10 strands/sq. in. (4 strands by 4 strands/sq. mm), in a Leno weave, for pipe.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Foster Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Mast-A-Fab.

b. Vimasco Corporation; Elastafab 894.

2.9 FIELD-APPLIED CLOTHS

A. Woven Glass-Fiber Fabric: Comply with MIL-C-20079H, Type I, plain weave, and presized a minimum of 8 oz./sq. yd. (271 g/sq. m).

1. Products: Subject to compliance with requirements, provide one of the following:

a. Alpha Associates, Inc.; Alpha-Maritex 84215 and 84217/9485RW, Luben 59.

2.10 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Johns Manville; Zeston.

b. P.I.C. Plastics, Inc.; FG Series.

c. Proto Corporation; LoSmoke.

d. Speedline Corporation; SmokeSafe.

2. Adhesive: As recommended by jacket material manufacturer.

3. Color: White.

4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

C. Metal Jacket:

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Brand, Specialty Construction Brands, Inc., a business of H. B. Fuller Company; Metal Jacketing Systems.

b. ITW Insulation Systems; Aluminum and Stainless Steel Jacketing.

c. RPR Products, Inc.; Insul-Mate.

2. Aluminum Jacket: Comply with ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005, Temper H-14.

a. Sheet and roll stock ready for shop or field sizing.

b. Finish and thickness are indicated in field-applied jacket schedules.

c. Moisture Barrier for Indoor Applications: 1-mil- (0.025-mm-) thick, heat-bonded polyethylene and kraft paper.

d. Moisture Barrier for Outdoor Applications: 3-mil- (0.075-mm-) thick, heat-bonded polyethylene and kraft paper.

e. Factory-Fabricated Fitting Covers:

1) Same material, finish, and thickness as jacket.

2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.

3) Tee covers.

4) Flange and union covers.

5) End caps.

6) Beveled collars.

7) Valve covers.

8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

3. Stainless-Steel Jacket: ASTM A 167 or ASTM A 240/A 240M.

a. Sheet and roll stock ready for shop or field sizing.

b. Material, finish, and thickness are indicated in field-applied jacket schedules.

c. Moisture Barrier for Indoor Applications: 1-mil- (0.025-mm-) thick, heat-bonded polyethylene and kraft paper.

d. Moisture Barrier for Outdoor Applications: 3-mil- (0.075-mm-) thick, heat-bonded polyethylene and kraft paper.

e. Factory-Fabricated Fitting Covers:

1) Same material, finish, and thickness as jacket.

2) Preformed 2-piece or gore, 45- and 90-degree, short- and long-radius elbows.

3) Tee covers.

4) Flange and union covers.

5) End caps.

6) Beveled collars.

7) Valve covers.

8) Field fabricate fitting covers only if factory-fabricated fitting covers are not available.

D. Underground Direct-Buried Jacket: 125-mil- (3.2-mm-) thick vapor barrier and waterproofing membrane consisting of a rubberized bituminous resin reinforced with a woven-glass fiber or polyester scrim and laminated aluminum foil.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Pittsburgh Corning Corporation; Pittwrap.

b. Polyguard Products, Inc.; Insulrap No Torch 125.

2.11 TAPES

A. ASJ Tape: White vapor-retarder tape matching factory-applied jacket with acrylic adhesive, complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ABI, Ideal Tape Division; 428 AWF ASJ.

b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0836.

c. Compac Corporation; 104 and 105.

d. Venture Tape; 1540 CW Plus, 1542 CW Plus, and 1542 CW Plus/SQ.

2. Width: 3 inches (75 mm).

3. Thickness: 11.5 mils (0.29 mm).

4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.

5. Elongation: 2 percent.

6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.

7. ASJ Tape Disks and Squares: Precut disks or squares of ASJ tape.

B. FSK Tape: Foil-face, vapor-retarder tape matching factory-applied jacket with acrylic adhesive; complying with ASTM C 1136.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ABI, Ideal Tape Division; 491 AWF FSK.

b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0827.

c. Compac Corporation; 110 and 111.

d. Venture Tape; 1525 CW NT, 1528 CW, and 1528 CW/SQ.

2. Width: 3 inches (75 mm).

3. Thickness: 6.5 mils (0.16 mm).

4. Adhesion: 90 ounces force/inch (1.0 N/mm) in width.

5. Elongation: 2 percent.

6. Tensile Strength: 40 lbf/inch (7.2 N/mm) in width.

7. FSK Tape Disks and Squares: Precut disks or squares of FSK tape.

C. PVC Tape: White vapor-retarder tape matching field-applied PVC jacket with acrylic adhesive; suitable for indoor and outdoor applications.

1. Products: Subject to compliance with requirements, provide one of the following:

a. ABI, Ideal Tape Division; 370 White PVC tape.

b. Compac Corporation; 130.

c. Venture Tape; 1506 CW NS.

2. Width: 2 inches (50 mm).

3. Thickness: 6 mils (0.15 mm).

4. Adhesion: 64 ounces force/inch (0.7 N/mm) in width.
5. Elongation: 500 percent.
6. Tensile Strength: 18 lbf/inch (3.3 N/mm) in width.

D. Aluminum-Foil Tape: Vapor-retarder tape with acrylic adhesive.

1. Products: Subject to compliance with requirements, provide one of the following:
   a. ABI, Ideal Tape Division; 488 AWF.
   b. Avery Dennison Corporation, Specialty Tapes Division; Fasson 0800.
   c. Compac Corporation; 120.
   d. Venture Tape; 3520 CW.
2. Width: 2 inches (50 mm).
3. Thickness: 3.7 mils (0.093 mm).
4. Adhesion: 100 ounces force/inch (1.1 N/mm) in width.
5. Elongation: 5 percent.
6. Tensile Strength: 34 lbf/inch (6.2 N/mm) in width.

2.12 SECUREMENTS

A. Bands:

1. Products: Subject to compliance with requirements, provide one of the following:
   a. ITW Insulation Systems; Gerrard Strapping and Seals.
   b. RPR Products, Inc.; Insul-Mate Strapping and Seals.
2. Stainless Steel: ASTM A 167 or ASTM A 240/A 240M, Type 304 or Type 316; 0.015 inch (0.38 mm) thick, 1/2 inch (13 mm) wide with wing seal or closed seal.
3. Aluminum: ASTM B 209 (ASTM B 209M), Alloy 3003, 3005, 3105, or 5005; Temper H-14, 0.020 inch (0.51 mm) thick, 1/2 inch (13 mm) wide with wing seal or closed seal.

B. Staples: Outward-clinching insulation staples, nominal 3/4-inch- (19-mm-) wide, stainless steel or Monel.

C. Wire: 0.080-inch (2.0-mm) nickel-copper alloy.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. C & F Wire.

2.13 PROTECTIVE SHIELDING GUARDS

A. Protective Shielding Pipe Covers,:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Engineered Brass Company.

b. Insul-Tect Products Co.; a subsidiary of MVG Molded Products.

c. McGuire Manufacturing.

d. Plumberex.

e. Truebro; a brand of IPS Corporation.

f. Zurn Industries, LLC; Tubular Brass Plumbing Products Operation.

2. Description: Manufactured plastic wraps for covering plumbing fixture hot-water supply and trap and drain piping. Comply with Americans with Disabilities Act (ADA) requirements.

B. Protective Shielding Piping Enclosures,:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Truebro; a brand of IPS Corporation.

b. Zurn Industries, LLC; Tubular Brass Plumbing Products Operation.

2. Description: Manufactured plastic enclosure for covering plumbing fixture hot- and cold-water supplies and trap and drain piping. Comply with ADA requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation tolerances and other conditions affecting performance of insulation application.

1. Verify that systems to be insulated have been tested and are free of defects.

2. Verify that surfaces to be insulated are clean and dry.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

1. Stainless Steel: Coat 300 series stainless steel with an epoxy primer 5 mils (0.127 mm) thick and an epoxy finish 5 mils (0.127 mm) thick if operating in a temperature range between 140 and 300 deg F (60 and 149 deg C). Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

2. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F (0 and 149 deg C) with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Coordinate insulation installation with the trade installing heat tracing. Comply with requirements for heat tracing that apply to insulation.

D. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

1. Install insulation continuously through hangers and around anchor attachments.

2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.

3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.

4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.

2. Cover circumferential joints with 3-inch- (75-mm-) wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches (100 mm) o.c.

3. Overlap jacket longitudinal seams at least 1-1/2 inches (38 mm). Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches (50 mm) o.c.

   a. For below-ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape, according to insulation material manufacturer's written instructions, to maintain vapor seal.

5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches (100 mm) beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above-ambient services, do not install insulation to the following:

1. Vibration-control devices.

2. Testing agency labels and stamps.

3. Nameplates and data plates.

4. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Roof Penetrations: Install insulation continuously through roof penetrations.

1. Seal penetrations with flashing sealant.

2. For applications requiring only indoor insulation, terminate insulation above roof surface and seal with joint sealant. For applications requiring indoor and outdoor insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.

3. Extend jacket of outdoor insulation outside roof flashing at least 2 inches (50 mm) below top of roof flashing.

4. Seal jacket to roof flashing with flashing sealant.

B. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

C. Insulation Installation at Aboveground Exterior Wall Penetrations: Install insulation continuously through wall penetrations.

1. Seal penetrations with flashing sealant.

2. For applications requiring only indoor insulation, terminate insulation inside wall surface and seal with joint sealant. For applications requiring indoor and outdoor

insulation, install insulation for outdoor applications tightly joined to indoor insulation ends. Seal joint with joint sealant.

3. Extend jacket of outdoor insulation outside wall flashing and overlap wall flashing at least 2 inches (50 mm).

4. Seal jacket to wall flashing with flashing sealant.

D. Insulation Installation at Interior Wall and Partition Penetrations (That Are Not Fire Rated): Install insulation continuously through walls and partitions.

E. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions.

1. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

F. Insulation Installation at Floor Penetrations:

1. Pipe: Install insulation continuously through floor penetrations.

2. Seal penetrations through fire-rated assemblies. Comply with requirements in Division 07 Section "Penetration Firestopping."

3.5 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity unless otherwise indicated.

2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.

3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.

4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily

removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below-ambient services, provide a design that maintains vapor barrier.

6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.

7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below-ambient services and a breather mastic for above-ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.

8. For services not specified to receive a field-applied jacket except for flexible elastomeric and polyolefin, install fitted PVC cover over elbows, tees, strainers, valves, flanges, and unions. Terminate ends with PVC end caps. Tape PVC covers to adjoining insulation facing using PVC tape.

9. Stencil or label the outside insulation jacket of each union with the word "union." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.

2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.

3. Construct removable valve insulation covers in same manner as for flanges, except divide the two-part section on the vertical center line of valve body.

4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches (50 mm) over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.6 INSTALLATION OF CELLULAR-GLASS INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above-ambient services, secure laps with outward clinched staples at 6 inches (150 mm) o.c.
4. For insulation with factory-applied jackets on below-ambient services, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.7 INSTALLATION OF FLEXIBLE ELASTOMERIC INSULATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.

4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.

2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.

2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.

3. Install insulation to flanges as specified for flange insulation application.

4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.8 INSTALLATION OF MINERAL-FIBER INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of preformed pipe insulation to pipe with wire or bands and tighten bands without deforming insulation materials.

2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.

3. For insulation with factory-applied jackets on above-ambient surfaces, secure laps with outward clinched staples at 6 inches (150 mm) o.c.

4. For insulation with factory-applied jackets on below-ambient surfaces, do not staple longitudinal tabs. Instead, secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.

2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.

3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with mineral-fiber blanket insulation.

4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch (25 mm), and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed insulation elbows and fittings are not available, install mitered sections of pipe insulation, to a thickness equal to adjoining pipe insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of same material as straight segments of pipe insulation when available.
2. When preformed sections are not available, install mitered sections of pipe insulation to valve body.
3. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
4. Install insulation to flanges as specified for flange insulation application.

3.9 INSTALLATION OF POLYOLEFIN INSULATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Seal split-tube longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of polyolefin sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of polyolefin pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install cut sections of polyolefin pipe and sheet insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

4. Secure insulation to valves and specialties, and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.10 FIELD-APPLIED JACKET INSTALLATION

A. Where glass-cloth jackets are indicated, install directly over bare insulation or insulation with factory-applied jackets.

1. Draw jacket smooth and tight to surface with 2-inch (50-mm) overlap at seams and joints.

2. Embed glass cloth between two 0.062-inch- (1.6-mm-) thick coats of lagging adhesive.

3. Completely encapsulate insulation with coating, leaving no exposed insulation.

B. Where FSK jackets are indicated, install as follows:

1. Draw jacket material smooth and tight.

2. Install lap or joint strips with same material as jacket.

3. Secure jacket to insulation with manufacturer's recommended adhesive.

4. Install jacket with 1-1/2-inch (38-mm) laps at longitudinal seams and 3-inch- (75-mm-) wide joint strips at end joints.

5. Seal openings, punctures, and breaks in vapor-retarder jackets and exposed insulation with vapor-barrier mastic.

C. Where PVC jackets are indicated, install with 1-inch (25-mm) overlap at longitudinal seams and end joints. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

D. Where metal jackets are indicated, install with 2-inch (50-mm) overlap at longitudinal seams and end joints. Overlap longitudinal seams arranged to shed water. Seal end joints with weatherproof sealant recommended by insulation manufacturer. Secure jacket with stainless-steel bands 12 inches (300 mm) o.c. and at end joints.

3.11 FINISHES

A. Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 09 painting Sections.

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

D. Do not field paint aluminum or stainless-steel jackets.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

D. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.13 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

B. Items Not Insulated: Unless otherwise indicated, do not install insulation on the following:

1. Drainage piping located in crawl spaces.

2. Underground piping.

3. Chrome-plated pipes and fittings unless there is a potential for personnel injury.

3.14 INDOOR PIPING INSULATION SCHEDULE

A. Domestic Hot and Recirculated Hot Water:

1. NPS 1-1/4 (DN 32) and Smaller: Insulation shall be one of the following:

a. Cellular Glass: 1-1/2 inches (38 mm) thick.

b. Flexible Elastomeric: 3/4 inch (19 mm) thick.

c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1/2 inch (13 mm) thick.

d. Phenolic: 1 inch (25 mm) thick.

e. Polyolefin: 3/4 inch (19 mm) thick.

2. NPS 1-1/2 (DN 40) and Larger: Insulation shall be one of the following:

a. Cellular Glass: 1-1/2 inches (38 mm) thick.

b. Flexible Elastomeric: 1 inch (25 mm) thick.

c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.

d. Phenolic: 1 inch (25 mm) thick.

e. Polyolefin: 1 inch (25 mm) thick.

B. Stormwater and Overflow:

1. All Pipe Sizes: Insulation shall be one of the following:
    a. Cellular Glass: 1-1/2 inches (38 mm) thick.
    b. Flexible Elastomeric: 1 inch (25 mm) thick.
    c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 1 inch (25 mm) thick.
    d. Phenolic: 1 inch (25 mm) thick.
    e. Polyolefin: 1 inch (25 mm) thick.

C. Hot Service Vents:
1. All Pipe Sizes: Insulation shall be one of the following:
    a. Cellular Glass: 1-1/2 inches (38 mm) thick.
    b. Mineral-Fiber, Preformed Pipe, Type I or II: 1 inch (25 mm) thick.

3.15 OUTDOOR, ABOVEGROUND PIPING INSULATION SCHEDULE

A. Domestic Hot and Recirculated Hot Water:
1. All Pipe Sizes: Insulation shall be one of the following:
    a. Cellular Glass: 2 inches (50 mm) thick.
    b. Flexible Elastomeric: 2 inches (50 mm) thick.
    c. Mineral-Fiber, Preformed Pipe Insulation, Type I: 2 inches (50 mm) thick.
    d. Phenolic: 2 inches (50 mm) thick.
    e. Polyolefin: 2 inches (50 mm) thick.

3.16 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:
1. None.
2. PVC: 20 mils (0.5 mm) thick.
3. Aluminum, Smooth: 0.016 inch (0.41 mm) thick.
4. Painted Aluminum, Smooth: 0.016 inch (0.41 mm) thick.
5. Stainless Steel, Type 304,: 0.010 inch (0.25 mm) thick.

D. Piping, Exposed:
1. None.
2. PVC: 20 mils (0.5 mm) thick.
3. Aluminum, Smooth: 0.016 inch (0.41 mm) thick.
4. Painted Aluminum, Smooth: 0.016 inch (0.41 mm) thick.

5. Stainless Steel, Type 304,: 0.010 inch (0.25 mm) thick.

3.17 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Concealed:

1. None.
2. PVC: 30 mils (0.8 mm) thick.
3. Aluminum, Smooth: 0.016 inch (0.41 mm) thick.
4. Painted Aluminum, Smooth: 0.016 inch (0.41 mm) thick.
5. Stainless Steel, Type 304: 0.010 inch (0.25 mm) thick.

D. Piping, Exposed:

1. PVC: 20 mils (0.5 mm) thick.
2. Aluminum, Smooth: 0.016 inch (0.41 mm) thick.
3. Stainless Steel, Type 304: 0.010 inch (0.25 mm) thick.

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SECTION 22 11 16 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. All equipment, accessories, etc. shall comply with the Buy America Act. Sub-Contractor shall coordinate with General Contractor for specific requirements.

1.2 SUMMARY

A. Section Includes:

1. Under-building slab and aboveground domestic water pipes, tubes, fittings, and specialties inside the building.
2. Encasement for piping.
3. Flexible connectors.
4. Water meters furnished by utility company for installation by Contractor.
5. Water meters.

B. Related Section:

1. Division 22 Section "Facility Water Distribution Piping" for water-service piping and water meters outside the building from source to the point where water-service piping enters the building.

1.3 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Domestic water piping and support and installation shall withstand effects of earthquake motions determined according to ASCE/SEI 7.

1.4 ACTION SUBMITTALS

A. Product Data: For the following products:

1. Specialty valves.
2. Transition fittings.
3. Dielectric fittings.
4. Flexible connectors.
5. Water meters.
6. Backflow preventers.
7. Water penetration systems.

1.5 INFORMATIONAL SUBMITTALS

A. Water Samples: Specified in "Cleaning" Article.

B. Coordination Drawings: For piping in equipment rooms and other congested areas, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Fire-suppression-water piping.
2. Domestic water piping.
3. HVAC hydronic piping.

C. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF 14 for plastic, potable domestic water piping and components. Include marking "NSF-pw" on piping.

C. Comply with NSF 61 for potable domestic water piping and components.

1.7 PROJECT CONDITIONS

A. Interruption of Existing Water Service: Do not interrupt water service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary water service according to requirements indicated:

1. Notify Owner no fewer than two days in advance of proposed interruption of water service.
2. Do not proceed with interruption of water service without Owner's written permission.

1.8 COORDINATION

A. Coordinate sizes and locations of concrete bases with actual equipment provided.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS UNDER-RAIL

A. Potable water conveyance: Ductile iron pipe and fittings supplied for potable water conveyance shall be cement-mortar lined in accordance with ANSI/AWWA C104/A21.4, *Cement-Mortar Lining for Ductile-Iron Pipe and Fittings.* The lined and coated product shall comply with the National Sanitation Foundation Specification NSF-61.

B. Above ground piping systems: Above ground pipe exposed to harsh environments, i.e. salt water spray shall be coated with 20 mils nominal thickness of Ceramawrap manufactured by Induron Coatings. The coating shall be applied in a coating manufacturer’s certified facility that is subjected to scheduled audits by the manufacturer for conformance with the manufacturer’s specified application procedures.

C. Pipe: Ductile iron pipe shall be designed in accordance with the latest revision of the American National Standard ANSI/AWWA C150/A21.50, Thickness Design ot Ductile-Iron Pipe, and manufactured in accordance with the latest revision of the American National Standard ANSI/AWWA C151/A21.51, Ductile-Iron Pipe, Centrifugally Cast. Pipe sizes 4-inch through 24-inch shall be supplied in 20 foot nominal lengths, Pipe sizes 30 through 42-inch shall be supplied in 18 foot nominal lengths, and pipe in sizes 48 – inch through 64-inch shall be supplied in 20 foot nominal lengths.

D. Joints: Flange Joints shall comply with the applicable portions of the American National Standards ANSI/AWWA C110/A21.10, Ductile-Iron and Gray-Iron Fittings, ANSI/AWWA C111/A21.11, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings, and ANSI/AWWA C115/A21.15, Flanged Ductile-Iron Pipe With Ductile-Iron or Gray-Iron Threaded Flanges. Flange joints shall be assembled with a ribbed style gasket such as the FLANGE-TYTE® Gasket marketed by United States Pipe and Foundry Company, LLC. Flanged joints in sizes 4-inch through 24-inch shall have a working water pressure rating of 350 psi when sealed with the FLANGE-TYTE®. Flanged joints in sizes 30-inch through 64-inch shall have a working water pressure rating of 250 psi when employing FLANGE-TYTE® Gaskets. Flanged piping shall not be employed for buried service.

Mechanical Joints shall conform to the American National Standard ANSI/AWWA C111/A21.11, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings. Mechanical Joints in 4-inch through 12-inch and 16-inch sizes shall be restrained by use of MJ FIELD LOK® Gaskets. For Mechanical joints 14-inch and larger restraint shall be provided by the use of footed retainer glands.

E. Fittings: Fittings for ductile iron pipe shall conform to the latest revision of the American National Standards ANSI/AWWA C110/A21.10, Ductile-Iron and Gray-Iron Fittings and ANSI/AWWA C153/A21.53, Ductile-Iron Compact Fittings. The fitting joints shall be of the same configuration as the pipe in in the system where they are installed. The fittings for potable water conveyance shall be supplied asphalt coated and cement-mortar lined in accordance with ANSI/AWWA C104/A21.4, Cement-Mortar Lining for Ductile-Iron Pipe and Fittings. Fittings for wastewater conveyance shall be lined with Protecto 401 in a lining manufacturer’s certified facility that is subjected to scheduled audits by the manufacturer for conformance with the manufacturer’s specified application procedures.

F. Installation: Pipe, Fittings, and appurtenances shall be installed in conformance with ANSI/AWWA C600, *Installation of Ductile-Iron Mains and Their Appurtenances.* When TR FLEX® Restrained Joint Pipe and Fittings are installed in an aboveground support system, i.e. pipe crossing a bridge, the pipe shall be installed on the supports isolated from the buried portion of the pipe system. After installation of the pipe on the supports, the installed pipe section shall be appropriately plugged and/or capped, filled with water, purged of air, and the internal pressure shall be raised to the project specified test pressure and the pressure held for the for the time period specified by the project specifications. After completion of the successful pressure test the pipe installed on the support system shall be connected to the buried pipe system.

2.2 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.3 COPPER TUBE AND FITTINGS

A. Hard Copper Tube: ASTM B 88, Type L water tube, drawn temper.

1. Cast-Copper Solder-Joint Fittings: ASME B16.18, pressure fittings.

2. Wrought-Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

3. Copper Unions: MSS SP-123, cast-copper-alloy, hexagonal-stock body, with ball-and-socket, metal-to-metal seating surfaces, and solder-joint or threaded ends.

B. Soft Copper Tube: ASTM B 88, Type K and ASTM B 88, Type L water tube, annealed temper.

1. Copper Solder-Joint Fittings: ASME B16.22, wrought-copper pressure fittings.

2.4 CPVC PIPING

A. CPVC Pipe: ASTM F 441/F 441M, Schedule 40.

1. CPVC Socket Fittings: ASTM F 438 for Schedule 40.

2.5 PEX PIPING

A. Crosslinked polyethylene (PEXa) piping.

B. Distribution manifold(s) with balancing and flow control valves where required.

C. Cold-expansion fittings.

D. Pipe fasteners as approved by the manufacturer of the PEXa piping.

E. Supervision and field engineering required for the complete and proper function of the system.

1. Standard grade hydrostatic pressure ratings from Plastics Pipe Institute in accordance with TR-3. The following three standard-grade hydrostatic ratings are required:

a. 200°F (93°C) at 80 psi (551 kPa)

b. 180°F (82°C) at 100 psi (689 kPa)

c. 73.4°F (23°C) at 160 psi (1102 kPa)

2. Listing of Flame Spread Index and Smoke Developed Index to ASTM E 84 (in U.S.) and ULC S102.2. (in Canada). It may be necessary to encase with 1/2 inch fiberglass insulation or ½ inch Armaflex insulation as required by the manufacturer's listing.

2.6 PIPING JOINING MATERIALS

A. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

B. Solvent Cements for Joining CPVC Piping and Tubing: ASTM F 493.

1. CPVC solvent cement shall have a VOC content of 490 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

3. Solvent cement and adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

2.7 ENCASEMENT FOR PIPING

A. Standard: ASTM A 674 or AWWA C105.

B. Form: Sheet.

C. Material: LLDPE film of 0.008-inch minimum thickness or high-density, cross-laminated PE film of 0.004-inch minimum thickness.

D. Color: Black.

2.8 TRANSITION FITTINGS

A. General Requirements:

1. Same size as pipes to be joined.

2. Pressure rating at least equal to pipes to be joined.

3. End connections compatible with pipes to be joined.

B. Fitting-Type Transition Couplings: Manufactured piping coupling or specified piping system fitting.

C. Sleeve-Type Transition Coupling: AWWA C219.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Cascade Waterworks Manufacturing.

b. Dresser, Inc.; Dresser Piping Specialties.

c. Ford Meter Box Company, Inc. (The).

d. JCM Industries.

e. Romac Industries, Inc.

f. Smith-Blair, Inc; a Sensus company.

g. Viking Johnson; c/o Mueller Co.

D. Plastic-to-Metal Transition Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Charlotte Pipe and Foundry Company.

b. Harvel Plastics, Inc.

c. Spears Manufacturing Company.

2. Description: CPVC one-piece fitting with manufacturer's Schedule 80 equivalent dimensions; one end with threaded brass insert and one solvent-cement-socket or threaded end.

E. Plastic-to-Metal Transition Unions:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Colonial Engineering, Inc.

b. NIBCO INC.

c. Spears Manufacturing Company.

2. Description: CPVC four-part union. Include brass or stainless-steel threaded end, solvent-cement-joint or threaded plastic end, rubber O-ring, and union nut.

2.9 DIELECTRIC FITTINGS

A. General Requirements: Assembly of copper alloy and ferrous materials with separating nonconductive insulating material. Include end connections compatible with pipes to be joined.

B. Dielectric Unions:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Capitol Manufacturing Company.

b. Central Plastics Company.

c. Hart Industries International, Inc.

d. Jomar International Ltd.

e. Matco-Norca, Inc.

f. McDonald, A. Y. Mfg. Co.

g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

h. Wilkins; a Zurn company.

2. Description:

a. Standard: ASSE 1079.

b. Pressure Rating: 150 psig.

c. End Connections: Solder-joint copper alloy and threaded ferrous.

C. Dielectric Flanges:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Capitol Manufacturing Company.
    b. Central Plastics Company.
    c. Matco-Norca, Inc.
    d. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
    e. Wilkins; a Zurn company.
2. Description:
    a. Standard: ASSE 1079.
    b. Factory-fabricated, bolted, companion-flange assembly.
    c. Pressure Rating: 150 psig .
    d. End Connections: Solder-joint copper alloy and threaded ferrous; threaded solder-joint copper alloy and threaded ferrous.

D. Dielectric-Flange Insulating Kits:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Advance Products & Systems, Inc.
    b. Calpico, Inc.
    c. Central Plastics Company.
    d. Pipeline Seal and Insulator, Inc.
2. Description:
    a. Nonconducting materials for field assembly of companion flanges.
    b. Pressure Rating: 150 psig.
    c. Gasket: Neoprene or phenolic.
    d. Bolt Sleeves: Phenolic or polyethylene.
    e. Washers: Phenolic with steel backing washers.

E. Dielectric Nipples:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    a. Elster Perfection.
    b. Grinnell Mechanical Products.
    c. Matco-Norca, Inc.

d. Precision Plumbing Products, Inc.

e. Victaulic Company.

2. Description:

a. Standard: IAPMO PS 66

b. Electroplated steel nipple. complying with ASTM F 1545.

c. Pressure Rating: 300 psig at 225 deg F.

d. End Connections: Male threaded or grooved.

e. Lining: Inert and noncorrosive, propylene.

2.10 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Flex-Hose Co., Inc.

2. Flexicraft Industries.

3. Flex Pression, Ltd.

4. Flex-Weld, Inc.

B. Bronze-Hose Flexible Connectors: Corrugated-bronze tubing with bronze wire-braid covering and ends brazed to inner tubing.

1. Working-Pressure Rating: Minimum 250 psig.

2. End Connections NPS 2 and Smaller: Threaded copper pipe or plain-end copper tube.

3. End Connections NPS 2-1/2 and Larger: Flanged copper alloy.

C. Stainless-Steel-Hose Flexible Connectors: Corrugated-stainless-steel tubing with stainless-steel wire-braid covering and ends welded to inner tubing.

1. Working-Pressure Rating: Minimum 250 psig.

2. End Connections NPS 2 and Smaller: Threaded steel-pipe nipple.

3. End Connections NPS 2-1/2 and Larger: Flanged steel nipple.

2.11 WATER METERS

A. Turbine-Type Water Meters:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. AALIANT; a Venture Measurement Product Line.

b. ABB.

c. Badger Meter, Inc.

d. Hays Fluid Controls.

e. Master Meter, Inc.

f. McCrometer.

g. Mueller Company; Water Products Division.

h. Schlumberger Limited; Water Division.

i. SeaMetrics Inc.

j. Sensus Metering Systems.

2. Description:

a. Standard: AWWA C701.

b. Pressure Rating: 150-psig working pressure.

c. Body Design: Turbine; totalization meter.

d. Registration: In gallons as required by utility company.

e. Case: Bronze.

f. End Connections for Meters NPS 2 nd Smaller: Threaded.

g. End Connections for Meters NPS 2-1/2 and Larger: Flanged.

PART 3 - EXECUTION

3.1 EARTHWORK

A. Comply with requirements in Division 31 Section "Earth Moving" for excavating, trenching, and backfilling.

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of domestic water piping. Indicated locations and arrangements are used to size pipe and calculate friction loss, expansion, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

B. Install copper tubing under building slab according to CDA's "Copper Tube Handbook."

C. Install ductile-iron piping under building slab with restrained joints according to AWWA C600 and AWWA M41.

D. Install underground copper tube in PE encasement according to ASTM A 674 or AWWA C105.

E. Install shutoff valve, hose-end drain valve, strainer, pressure gage, and test tee with valve, inside the building at each domestic water service entrance. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for pressure gages and Division 22 Section "Domestic Water Piping Specialties" for drain valves and strainers.

F. Install shutoff valve immediately upstream of each dielectric fitting.

G. Install water-pressure-reducing valves downstream from shutoff valves. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for pressure-reducing valves.

H. Install domestic water piping level without pitch and plumb.

I. Rough-in domestic water piping for water-meter installation according to utility company's requirements.

J. Install seismic restraints on piping. Comply with requirements in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment" for seismic-restraint devices.

K. Install piping concealed from view and protected from physical contact by building occupants unless otherwise indicated and except in equipment rooms and service areas.

L. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

M. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal, and coordinate with other services occupying that space.

N. Install piping adjacent to equipment and specialties to allow service and maintenance.

O. Install piping to permit valve servicing.

P. Install nipples, unions, special fittings, and valves with pressure ratings the same as or higher than system pressure rating used in applications below unless otherwise indicated.

Q. Install piping free of sags and bends.

R. Install fittings for changes in direction and branch connections.

S. Install unions in copper tubing at final connection to each piece of equipment, machine, and specialty.

T. Install pressure gages on suction and discharge piping from each plumbing pump and packaged booster pump. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for pressure gages.

U. Install thermostats in hot-water circulation piping. Comply with requirements in Division 22 Section "Domestic Water Pumps" for thermostats.

V. Install thermometers on outlet piping from each water heater. Comply with requirements in Division 22 Section "Meters and Gages for Plumbing Piping" for thermometers.

W. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."

X. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Division 22 Section "Sleeves and Sleeve Seals for Plumbing Piping."

Y. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Division 22 Section "Escutcheons for Plumbing Piping."

3.3 PEX INSTALLATION

A. Install in accordance with manufacturer's published installation manual and/or technical guidelines and final drawings. Technical guidelines are the most current and applicable versions of all the technical literature, including but not limited to technical manuals, installation guides, technical bulletins, training presentations and submittals

B. Manifolds shall be mounted as level as possible.

C. Route piping in an orderly manner, according to layout and spacing shown in final drawings. All installation notes shown on the drawings shall be followed.

D. At connections and fittings, use a plastic pipe cutter to ensure square (90°) and clean cuts, and join pipes immediately or cap ends of pipe to seal from contaminants.

E. Pipe shall be dispensed using a suitable uncoiling device. Remove twists prior to securing pipe. Pipe shall lie flat on an even plane.

F. Piping that passes through expansion joints or walls shall be covered in protective polyethylene convoluted sleeving (flexible conduit) extending 15 in (38 cm) on each side of the joint. Sleeving shall be secured on pipe to prevent movement during installation.

G. Where piping enters or exits a wall a protective conduit shall be placed around the pipe, with the conduit extending a minimum of 6 in (15 cm) into the wall and exiting by a minimum of 6 in (15 cm). For penetrations at manifolds, use rigid PVC bend guides secured in place to prevent movement

3.4 JOINT CONSTRUCTION

A. Ream ends of pipes and tubes and remove burrs.

B. Remove scale, slag, dirt, and debris from inside and outside of pipes, tubes, and fittings before assembly.

C. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads.

2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux to end of tube. Join copper tube and fittings according to ASTM B 828 or CDA's "Copper Tube Handbook."

E. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements. Apply primer.

2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.

3. PVC Piping: Join according to ASTM D 2855.

F. Dissimilar-Material Piping Joints: Make joints using adapters compatible with materials of both piping systems.

3.5 VALVE INSTALLATION

A. General-Duty Valves: Comply with requirements in Division 22 Section "General-Duty Valves for Plumbing Piping" for valve installations.

B. Install shutoff valve close to water main on each branch and riser serving plumbing fixtures or equipment, on each water supply to equipment, and on each water supply to plumbing fixtures that do not have supply stops. Use ball or gate valves for piping NPS 2 and smaller. Use butterfly or gate valves for piping NPS 2-1/2 and larger.

C. Install drain valves for equipment at base of each water riser, at low points in horizontal piping, and where required to drain water piping. Drain valves are specified in Division 22 Section "Domestic Water Piping Specialties."

1. Hose-End Drain Valves: At low points in water mains, risers, and branches.

2. Stop-and-Waste Drain Valves: Instead of hose-end drain valves where indicated.

D. Install balancing valve in each hot-water circulation return branch and discharge side of each pump and circulator. Set balancing valves partly open to restrict but not stop flow. Use ball valves for piping NPS 2 and smaller and butterfly valves for piping NPS 2-1/2 and larger. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for balancing valves.

E. Install calibrated balancing valves in each hot-water circulation return branch and discharge side of each pump and circulator. Set calibrated balancing valves partly open to restrict but not stop flow. Comply with requirements in Division 22 Section "Domestic Water Piping Specialties" for calibrated balancing valves.

3.6 TRANSITION FITTING INSTALLATION

A. Install transition couplings at joints of dissimilar piping.

B. Transition Fittings in Underground Domestic Water Piping:

1. NPS 1-1/2 and Smaller: Fitting-type coupling.

2. NPS 2 and Larger: Sleeve-type coupling.

C. Transition Fittings in Aboveground Domestic Water Piping NPS and Smaller: Plastic-to-metal transition fittings or unions.

3.7 DIELECTRIC FITTING INSTALLATION

A. Install dielectric fittings in piping at connections of dissimilar metal piping and tubing.

B. Dielectric Fittings for NPS 2 and Smaller: Use dielectric couplings.

C. Dielectric Fittings for NPS 2-1/2 to NPS 4 : Use dielectric flanges.

D. Dielectric Fittings for NPS 5 and Larger: Use dielectric flange kits.

3.8 FLEXIBLE CONNECTOR INSTALLATION

A. Install flexible connectors in suction and discharge piping connections to each domestic water pump and in suction and discharge manifold connections to each domestic water booster pump.

B. Install bronze-hose flexible connectors in copper domestic water tubing.

C. Install stainless-steel-hose flexible connectors in steel domestic water piping.

3.9 WATER METER INSTALLATION

A. Rough-in domestic water piping for water meter installation according to utility company's requirements.

B. Water meters will be furnished and installed by utility company.

C. Install water meters according to AWWA M6, utility company's requirements, and the following:

D. Install displacement-type water meters with shutoff valve on water-meter inlet. Install valve on water-meter outlet and valved bypass around meter unless prohibited by authorities having jurisdiction.

E. Install turbine-type water meters with shutoff valve on water-meter inlet. Install valve on water-meter outlet and valved bypass around meter unless prohibited by authorities having jurisdiction.

F. Install compound-type water meters with shutoff valves on water-meter inlet and outlet and on valved bypass around meter. Support meters, valves, and piping on brick or concrete piers.

G. Install fire-service water meters with shutoff valves on water-meter inlet and outlet and on full-size valved bypass around meter. Support meter, valves, and piping on brick or concrete piers.

H. Install remote registration system according to standards of utility company and of authorities having jurisdiction.

3.10 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements in Division 22 Section "Vibration and Seismic Controls for Plumbing Piping and Equipment" for seismic-restraint devices.

B. Comply with requirements in Division 22 Section "Hangers and Supports for Plumbing Piping and Equipment" for pipe hanger and support products and installation.

1. Vertical Piping: MSS Type 8 or 42, clamps.

2. Individual, Straight, Horizontal Piping Runs:

a. 100 Feet and Less: MSS Type 1, adjustable, steel clevis hangers.

b. Longer than 100 Feet MSS Type 43, adjustable roller hangers.

c. Longer Than 100 Feet If Indicated: MSS Type 49, spring cushion rolls.

3. Multiple, Straight, Horizontal Piping Runs 100 or Longer: MSS Type 44, pipe rolls. Support pipe rolls on trapeze.
4. Base of Vertical Piping: MSS Type 52, spring hangers.

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, to a minimum of 3/8 inch (10 mm).

E. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 3/4 and Smaller: 60 inches with 3/8-inch rod.
2. NPS 1 and NPS 1-1/4: 72 inches with 3/8-inch rod.
3. NPS 1-1/2 and NPS 2: 96 inches with 3/8-inch rod.
4. NPS 2-1/2: 108 inches with 1/2-inch rod.
5. NPS 3 to NPS 5: 10 feet with 1/2-inch rod.
6. NPS 6: 10 feet with 5/8-inch rod.
7. NPS 8: 10 feet with 3/4-inch rod.

F. Install supports for vertical copper tubing every 10 feet.

G. Install hangers for steel piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4 and Smaller: 84 inches with 3/8-inch rod.
2. NPS 1-1/2 108 inches with 3/8-inch rod.
3. NPS 2 10 feet with 3/8-inch rod.
4. NPS 2-1/2; 11 feet with 1/2-inch rod.
5. NPS 3 and NPS 3-1/2 12 feet with 1/2- rod.
6. NPS 4 and NPS 5 : 12 feet with 5/8-inch rod.
7. NPS 6 : 12 feet with 3/4-inch rod.
8. NPS 8 to NPS 12 12 feet with 7/8-inch rod.

H. Install supports for vertical steel piping every 15 feet

I. Install vinyl-coated hangers for CPVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1 and Smaller: 36 inches with 3/8-inch rod.
2. NPS 1-1/4 to NPS 2 48 inches with 3/8-inch rod.
3. NPS 2-1/2 to NPS 3-1/2 48 inches with 1/2-inch rod.
4. NPS 4 and NPS 5 48 inches with 5/8-inch rod.
5. NPS 6 48 inches with 3/4-inch rod.
6. NPS 8 48 inches with 7/8-inch rod.

J. Install supports for vertical CPVC piping every 60 inches for NPS 1 and smaller, and every 72 inches for NPS 1-1/4 and larger.

K. Install vinyl-coated hangers for PEX piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1 and Smaller: 32 inches with 3/8-inch rod.

L. Install vinyl-coated hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 2 and Smaller: 48 inches with 3/8-inch rod.
2. NPS 2-1/2 to NPS 3-1/2 48 inches with 1/2-inch rod.
3. NPS 4 and NPS 5 48 inches with 5/8-inch rod.
4. NPS 6: 48 inches with 3/4-inch rod.
5. NPS 8: 48 inches with 7/8-inch rod.
6. Install supports for vertical PVC piping every 48 inches.

M. Support piping and tubing not listed in this article according to MSS SP-69 and manufacturer's written instructions.

3.11 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment and machines to allow service and maintenance.

C. Connect domestic water piping to exterior water-service piping. Use transition fitting to join dissimilar piping materials.

D. Connect domestic water piping to water-service piping with shutoff valve; extend and connect to the following:

1. Domestic Water Booster Pumps: Cold-water suction and discharge piping.
2. Water Heaters: Cold-water inlet and hot-water outlet piping in sizes indicated, but not smaller than sizes of water heater connections.
3. Plumbing Fixtures: Cold- and hot-water supply piping in sizes indicated, but not smaller than required by plumbing code. Comply with requirements in Division 22 plumbing fixture Sections for connection sizes.
4. Equipment: Cold- and hot-water supply piping as indicated, but not smaller than equipment connections. Provide shutoff valve and union for each connection. Use flanges instead of unions for NPS 2-1/2 and larger.

3.12 IDENTIFICATION

A. Identify system components. Comply with requirements in Division 22 Section "Identification for Plumbing Piping and Equipment" for identification materials and installation.

B. Label pressure piping with system operating pressure.

3.13 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Piping Inspections:

1. Do not enclose, cover, or put piping into operation until it has been inspected and approved by authorities having jurisdiction.

2. During installation, notify authorities having jurisdiction at least one day before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction:

a. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.

b. Final Inspection: Arrange final inspection for authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

3. Reinspection: If authorities having jurisdiction find that piping will not pass tests or inspections, make required corrections and arrange for reinspection.

4. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

C. Piping Tests:

1. Fill domestic water piping. Check components to determine that they are not air bound and that piping is full of water.

2. Test for leaks and defects in new piping and parts of existing piping that have been altered, extended, or repaired. If testing is performed in segments, submit a separate report for each test, complete with diagram of portion of piping tested.

3. Leave new, altered, extended, or replaced domestic water piping uncovered and unconcealed until it has been tested and approved. Expose work that was covered or concealed before it was tested.

4. Cap and subject piping to static water pressure of 50 psig above operating pressure, without exceeding pressure rating of piping system materials. Isolate test source and allow to stand for four hours. Leaks and loss in test pressure constitute defects that must be repaired.

5. Repair leaks and defects with new materials and retest piping or portion thereof until satisfactory results are obtained.

6. Prepare reports for tests and for corrective action required.

D. Domestic water piping will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.14. PEX FIELD QUALITY CONTROL

A. Filling, Testing & Balancing: Tests of domestic plumbing systems shall comply with authorities having jurisdiction, and, where required, shall be witnessed by the building official.

B. Pressure gauges used in testing and balancing shall show pressure increments of 1 psig and shall be located at or near the lowest points in the distribution system.

C. Air Test:

1. Charge the completed, yet unconcealed pipes with air at a minimum of 40 psig.
2. Do not exceed 150 psig.
3. Use soap solution to check for leakage at manifold connections.

D. Water Test:

1. Purge air from pipes.
2. Charge the completed, yet unconcealed pipes with water.
3. Take necessary precautions to prevent water from freezing.
4. Check the system for leakage, especially at all pipe joints.

E. Perform a preliminary pressure test pressurizing the system to the greater of 1.5 times the maximum operating pressure or 100 psig for 30 minutes.

1. As the piping expands, restore pressure, first at 10 minutes into the test and again at 20 minutes.
2. At the end of the 30-minute preliminary test, pressure shall not fall by more than 8 psig from the maximum, and there shall be no leakage.

F. After successfully performing the preliminary pressure test, perform the main pressure test immediately.

1. The test pressure shall be restored and continued as the main test for 2 hours.
2. The main test pressure shall not fall more than 3 psig after 2 hours.
3. No leakage shall be detected.

G. Complete inspection and furnish test reports supplied by the manufacturer of the system.

H. Cleaning

1. Clean exposed surfaces upon completion of installation using clean, damp cloth. No cleaning agents are allowed.

2. Comply with manufacturer’s recommendations.

I. Protection

1. Protect installation throughout construction process until date of final completion.

2. Replace components that cannot be repaired

3.15 ADJUSTING

A. Perform the following adjustments before operation:

1. Close drain valves, hydrants, and hose bibbs.
2. Open shutoff valves to fully open position.
3. Open throttling valves to proper setting.
4. Adjust balancing valves in hot-water-circulation return piping to provide adequate flow.
   a. Manually adjust ball-type balancing valves in hot-water-circulation return piping to provide flow of hot water in each branch.
   b. Adjust calibrated balancing valves to flows indicated.
5. Remove plugs used during testing of piping and for temporary sealing of piping during installation.
6. Remove and clean strainer screens. Close drain valves and replace drain plugs.
7. Remove filter cartridges from housings and verify that cartridges are as specified for application where used and are clean and ready for use.
8. Check plumbing specialties and verify proper settings, adjustments, and operation.

3.16 CLEANING

A. Clean and disinfect potable domestic water piping as follows:
   1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
   2. Use purging and disinfecting procedures prescribed by authorities having jurisdiction; if methods are not prescribed, use procedures described in either AWWA C651 or AWWA C652 or follow procedures described below:
      a. Flush piping system with clean, potable water until dirty water does not appear at outlets.
      b. Fill and isolate system according to either of the following:
         1) Fill system or part thereof with water/chlorine solution with at least 50 ppm of chlorine. Isolate with valves and allow to stand for 24 hours.
         2) Fill system or part thereof with water/chlorine solution with at least 200 ppm of chlorine. Isolate and allow to stand for three hours.
      c. Flush system with clean, potable water until no chlorine is in water coming from system after the standing time.
      d. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

B. Clean non-potable domestic water piping as follows:
   1. Purge new piping and parts of existing piping that have been altered, extended, or repaired before using.
   2. Use purging procedures prescribed by authorities having jurisdiction or; if methods are not prescribed, follow procedures described below:

a. Flush piping system with clean, potable water until dirty water does not appear at outlets.

b. Submit water samples in sterile bottles to authorities having jurisdiction. Repeat procedures if biological examination shows contamination.

C. Prepare and submit reports of purging and disinfecting activities.

D. Clean interior of domestic water piping system. Remove dirt and debris as work progresses.

3.17 PIPING SCHEDULE

A. Transition and special fittings with pressure ratings at least equal to piping rating may be used in applications below unless otherwise indicated.

B. Flanges and unions may be used for aboveground piping joints unless otherwise indicated.

C. Fitting Option: Extruded-tee connections and brazed joints may be used on aboveground copper tubing.

D. Under-building-slab, domestic water, building-service piping, NPS 4 to NPS 8 and larger, shall be one of the following:

1. Mechanical-joint, ductile-iron pipe; standard- pattern mechanical-joint fittings; and mechanical joints.

2. PVC, Schedule 80 pipe; PVC, Schedule 80 socket fittings; and solvent-cemented joints.

E. Aboveground domestic water piping, NPS 2 and smaller, shall be one of the following:

1. Hard copper tube, ASTM B 88, Type L; cast- or wrought- copper solder-joint fittings; and soldered joints.

2. CPVC, Schedule 40 pipe; CPVC, Schedule 40 socket fittings; and solvent-cemented joints.

F. Aboveground domestic water piping, NPS 2-1/2 to NPS 4, shall be one of the following:

1. Hard copper tube, ASTM B 88, Type L cast- or wrought- copper solder-joint fittings; and soldered joints.

2. CPVC, Schedule 40 pipe; CPVC, Schedule 40 socket fittings; and solvent-cemented joints.

G. Aboveground domestic water piping, NPS 5 to NPS 8 shall be one of the following:

1. Galvanized-steel pipe; grooved-joint, galvanized-steel-pipe appurtenances; and grooved joints.

2. CPVC, Schedule 80 pipe; CPVC, Schedule 80 threaded fittings; and threaded joints.

3.18 VALVE SCHEDULE

A. Drawings indicate valve types to be used. Where specific valve types are not indicated, the following requirements apply:

1. Shutoff Duty: Use ball or gate valves for piping NPS 2 and smaller. Use ball, or gate valves with flanged ends for piping NPS 2-1/2 and larger.
2. Throttling Duty: Use ball or globe valves for piping NPS 2 and smaller. Use butterfly or ball valves with flanged ends for piping NPS 2-1/2 and larger.
3. Hot-Water Circulation Piping, Balancing Duty: Calibrated balancing valves.
4. Drain Duty: Hose-end drain valves.

B. Use check valves to maintain correct direction of domestic water flow to and from equipment.

C. Iron grooved-end valves may be used with grooved-end piping.

D. CPVC valves matching piping materials may be used.

END OF SECTION 22 11 16

SECTION 22 11 19 - DOMESTIC WATER PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. All equipment, accessories, etc. shall comply with the Buy America Act. Sub-Contractor shall coordinate with General Contractor for specific requirements.

1.2 SUMMARY

A. This Section includes the following domestic water piping specialties:

1. Vacuum breakers.
2. Backflow preventers.
3. Water pressure-reducing valves.
4. Balancing valves.
5. Temperature-actuated water mixing valves.
6. Outlet boxes.
7. Hose bibbs.
8. Wall hydrants.
9. Water hammer arresters.
10. Trap-seal primer valves.
11. Trap-seal primer systems.

B. Related Sections include the following:

1. Division 22 Section "Meters and Gages For Plumbing Piping" for thermometers, pressure gages, and flow meters in domestic water piping.
2. Division 22 Section "Domestic Water Piping" for water meters.
3. Division 22 Section "Drinking Fountains and Water Coolers" for water filters for water coolers.

1.3 PERFORMANCE REQUIREMENTS

A. Minimum Working Pressure for Domestic Water Piping Specialties: 125 psig, unless otherwise indicated.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: Diagram power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control test reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For domestic water piping specialties to include in emergency, operation, and maintenance manuals.

1.7 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

B. NSF Compliance:

1. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic domestic water piping components.

2. Comply with NSF 61, "Drinking Water System Components - Health Effects; Sections 1 through 9."

PART 2 - PRODUCTS

2.1 VACUUM BREAKERS

A. Pipe-Applied, Atmospheric-Type Vacuum Breakers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Conbraco Industries, Inc.
   b. FEBCO; SPX Valves & Controls.
   c. Watts Industries, Inc.; Water Products Div.
   d. Zurn Plumbing Products Group; Wilkins Div.
2. Standard: ASSE 1001.
3. Size: NPS 1/4 to NPS 3, as required to match connected piping.
4. Body: Bronze.
5. Inlet and Outlet Connections: Threaded.
6. Finish: Chrome plated.

B. Hose-Connection Vacuum Breakers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Watts Industries, Inc.; Water Products Div.
   b. Woodford Manufacturing Company.
   c. Zurn Plumbing Products Group; Light Commercial Operation.
   d. Zurn Plumbing Products Group; Wilkins Div.
2. Standard: ASSE 1011.
3. Body: Bronze, nonremovable, with manual drain.

4. Outlet Connection: Garden-hose threaded complying with ASME B1.20.7.
5. Finish: Rough bronze.

2.2 BACKFLOW PREVENTERS

A. Reduced-Pressure-Principle Backflow Preventers:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Conbraco Industries, Inc.
b. FEBCO; SPX Valves & Controls.
c. Watts Industries, Inc.; Water Products Div.
d. Zurn Plumbing Products Group; Wilkins Div.
2. Standard: ASSE 1013.
3. Operation: Continuous-pressure applications.
4. Configuration: See Plumbing Drawings.

B. Double-Check Backflow-Prevention Assemblies:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Conbraco Industries, Inc.
b. FEBCO; SPX Valves & Controls.
c. Watts Industries, Inc.; Water Products Div.
d. Zurn Plumbing Products Group; Wilkins Div.
2. Standard: ASSE 1015.
3. Operation: Continuous-pressure applications.

C. Beverage-Dispensing-Equipment Backflow Preventers:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Conbraco Industries, Inc.
b. Watts Industries, Inc.; Water Products Div.
c. Zurn Plumbing Products Group; Wilkins Div.
2. Standard: ASSE 1022.
3. Operation: Continuous-pressure applications.
4. Size: NPS 1/4 or NPS 3/8.
5. Body: Stainless steel.
6. End Connections: Threaded.

D. Carbonated-Beverage-Dispenser, Dual-Check-Valve Backflow Preventers:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Cash Acme.
b. Lancer Corporation.
c. Watts Industries, Inc.; Water Products Div.

2. Standard: ASSE 1032.
3. Operation: Continuous-pressure applications.
4. Size: NPS 1/4 or NPS 3/8.
5. Body: Stainless steel.
6. End Connections: Threaded.

E. Backflow-Preventer Test Kits:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Conbraco Industries, Inc.
   b. FEBCO; SPX Valves & Controls.
   c. Watts Industries, Inc.; Water Products Div.
   d. Zurn Plumbing Products Group; Wilkins Div.
2. Description: Factory calibrated, with gages, fittings, hoses, and carrying case with test-procedure instructions.

2.3 WATER PRESSURE-REDUCING VALVES

A. Water Regulators:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Conbraco Industries, Inc.
   b. Watts Industries, Inc.; Water Products Div.
   c. Zurn Plumbing Products Group; Wilkins Div.
2. Standard: ASSE 1003.
3. Pressure Rating: Initial working pressure of 150 psig .
4. Design Inlet Pressure: See Plumbing Drawings.
5. Design Outlet Pressure Setting: See Plumbing Drawings.
6. Body: Bronze with chrome-plated finish for NPS 2 and smaller; cast iron with interior lining complying with AWWA C550 or that is FDA approved for NPS 2-1/2 and NPS 3.
7. End Connections: Threaded for NPS 2 and smaller; flanged for NPS 2-1/2 and NPS 3.

2.4 BALANCING VALVES

A. Copper-Alloy Calibrated Balancing Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Armstrong International, Inc.
   b. ITT Industries; Bell & Gossett Div.
   c. NIBCO INC.
   d. Taco, Inc.

e. Watts Industries, Inc.; Water Products Div.
2. Type: Ball valve with two readout ports and memory setting indicator.
3. Body: Brass or bronze.
4. Size: Same as connected piping
5. Accessories: Meter hoses, fittings, valves, differential pressure meter, and carrying case.

2.5 TEMPERATURE-ACTUATED WATER MIXING VALVES

A. Water-Temperature Limiting Devices:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Conbraco Industries, Inc.
b. Powers; a Watts Industries Co.
c. Symmons Industries, Inc.
d. Watts Industries, Inc.; Water Products Div.
e. Zurn Plumbing Products Group; Wilkins Div.
2. Standard: ASSE 1017.
3. Pressure Rating: 125 psig
4. Type: Thermostatically controlled water mixing valve.
5. Material: Bronze body with corrosion-resistant interior components.
6. Connections: Threaded inlets and outlet.
7. Accessories: Check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
8. Tempered-Water Setting: See Plumbing Drawings.
9. Tempered-Water Design Flow Rate: See Plumbing Drawings.
10. Valve Finish: Rough bronze.

B. Primary, Thermostatic, Water Mixing Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Armstrong International, Inc.
b. Leonard Valve Company.
c. Powers; a Watts Industries Co.
d. Symmons Industries, Inc.
2. Standard: ASSE 1017.
3. Pressure Rating: 125 psig.
4. Type: Exposed-mounting, thermostatically controlled water mixing valve.
5. Material: Bronze body with corrosion-resistant interior components.
6. Connections: Threaded inlets and outlet.
7. Accessories: Manual temperature control, check stops on hot- and cold-water supplies, and adjustable, temperature-control handle.
8. Valve Pressure Rating: 125 psig minimum, unless otherwise indicated.
9. Tempered-Water Setting: See Plumbing Drawings.

10. Tempered-Water Design Flow Rate: See Plumbing Drawings.
11. Pressure Drop at Design Flow Rate: See Plumbing Drawings.
12. Valve Finish: Rough bronze.
13. Piping Finish: Copper.
14. Cabinet: Factory-fabricated, stainless steel, for surface mounting and with hinged, stainless-steel door.

C. Manifold, Thermostatic, Water-Mixing-Valve Assemblies:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Leonard Valve Company.
   b. Powers; a Watts Industries Co.
   c. Symmons Industries, Inc.
2. Description: Factory-fabricated, exposed-mounting, thermostatically controlled, water-mixing-valve assembly in two-valve parallel arrangement.
3. Large-Flow Parallel: Thermostatic water mixing valve and downstream pressure regulator with pressure gages on inlet and outlet.
4. Intermediate-Flow Parallel: Thermostatic water mixing valve and downstream pressure regulator with pressure gages on inlet and outlet.
5. Small-Flow Parallel: Thermostatic water mixing valve.
6. Thermostatic Mixing Valves: Comply with ASSE 1017. Include check stops on hot- and cold-water inlets and shutoff valve on outlet.
7. Water Regulator(s): Comply with ASSE 1003. Include pressure gage on inlet and outlet.
8. Component Pressure Ratings: 125 psig minimum, unless otherwise indicated.
9. Cabinet: Factory-fabricated, stainless steel, for surface mounting and with hinged, stainless-steel door.
10. Selected Large Flow, Tempered Water Valve Size: See Plumbing Drawings.
11. Tempered-Water Setting: See Plumbing Drawings.
12. Unit Tempered-Water Design Flow Rate: See Plumbing Drawings.
13. Unit Minimum Tempered-Water Design Flow Rate: See Plumbing Drawings.
14. Unit Pressure Drop at Design Flow Rate: (kPa)S
15. Unit Tempered-Water Outlet Size: See Plumbing Drawings.
16. Unit Hot- and Cold-Water Inlet Size: See Plumbing Drawings.
17. Thermostatic Mixing Valve and Water Regulator Finish: Rough bronze.
18. Piping Finish: Copper.

D. Individual-Fixture, Water Tempering Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Conbraco Industries, Inc.
   b. Leonard Valve Company.
   c. Powers; a Watts Industries Co.
   d. Watts Industries, Inc.; Water Products Div.

e. Zurn Plumbing Products Group; Wilkins Div.
2. Standard: ASSE 1016, thermostatically controlled water tempering valve.
3. Pressure Rating: 125 psig minimum, unless otherwise indicated.
4. Body: Bronze body with corrosion-resistant interior components.
5. Temperature Control: Adjustable.
6. Inlets and Outlet: Threaded.
7. Finish: Rough or chrome-plated bronze.
8. Tempered-Water Setting: See Plumbing Drawings.
9. Tempered-Water Design Flow Rate: See Plumbing Drawings.

2.6 OUTLET BOXES

A. Icemaker Outlet Boxes:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Acorn Engineering Company.
b. IPS Corporation.
2. Mounting: Recessed.
3. Material and Finish: Enameled-steel or epoxy-painted-steel box and faceplate.
4. Faucet: Valved fitting complying with ASME A112.18.1. Include NPS 1/2 or smaller copper tube outlet.
5. Supply Shutoff Fitting: NPS 1/2 gate, globe, or ball valve and NPS 1/2 copper, water tubing.

2.7 HOSE BIBS

A. Hose Bibs:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
a. Josam Company.
b. Prier Products, Inc.
c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
d. Watts Drainage Products Inc.
e. Woodford Manufacturing Company.
f. Zurn Plumbing Products Group; Light Commercial Operation.
g. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.18.1 for sediment faucets.
3. Body Material: Bronze.
4. Seat: Bronze, replaceable.
5. Supply Connections: NPS 1/2 or NPS 3/4 threaded or solder-joint inlet.
6. Outlet Connection: Garden-hose thread complying with ASME B1.20.7.
7. Pressure Rating: 125 psig.

8. Vacuum Breaker: Integral nonremovable, drainable, hose-connection vacuum breaker complying with ASSE 1011.
9. Finish for Equipment Rooms: Rough bronze, or chrome plated.
10. Finish for Finished Rooms: Chrome plated.
11. Operation for Equipment Rooms: Wheel handle.
12. Operation for Finished Rooms: Operating key.
13. Include operating key with each operating-key hose bibb.

2.8 WALL HYDRANTS

A. Nonfreeze Wall Hydrants:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Josam Company.
   b. Prier Products, Inc.
   c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
   d. Watts Drainage Products Inc.
   e. Woodford Manufacturing Company.
   f. Zurn Plumbing Products Group; Light Commercial Operation.
   g. Zurn Plumbing Products Group; Specification Drainage Operation.
2. Standard: ASME A112.21.3M for concealed outlet, self-draining wall hydrants.
3. Pressure Rating: 125 psig.
4. Operation: Loose key.
5. Casing and Operating Rod: Of length required to match wall thickness. Include wall clamp.
6. Inlet: NPS 3/4.
7. Description: See Plumbing Drawings.
8. Operating Keys(s): One with each wall hydrant.

2.9 DRAIN VALVES

A. Ball-Valve-Type, Hose-End Drain Valves:
1. Standard: MSS SP-110 for standard-port, two-piece ball valves.
2. Pressure Rating: 125-psig minimum CWP.
3. Size: NPS 3/4.
4. Body: Copper alloy.
5. Ball: Chrome-plated brass.
6. Seats and Seals: Replaceable.
7. Handle: Vinyl-covered steel.
8. Inlet: Threaded or solder joint.
9. Outlet: Threaded, short nipple with garden-hose thread complying with ASME B1.20.7 and cap with brass chain.

B. Stop-and-Waste Drain Valves:

1. Standard: MSS SP-110 for ball valves or MSS SP-80 for gate valves.
2. Pressure Rating: 200-psig minimum CWP or Class 125.
3. Size: NPS 3/4.
4. Body: Copper alloy or ASTM B 62 bronze.
5. Drain: NPS 1/8 side outlet with cap.

2.10 WATER HAMMER ARRESTERS

A. Water Hammer Arresters:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. Josam Company.
   b. Sioux Chief Manufacturing Company
   c. Precision Plumbing Products
2. Standard: ASSE 1010 or PDI-WH 201.
3. Type: Copper tube with piston with threaded end connection.
4. Size: ASSE 1010, Sizes AA and A through F or PDI-WH 201, Sizes A through F.

2.11 TRAP-SEAL PRIMER VALVES

A. Supply-Type, Trap-Seal Primer Valves:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. PPP Inc.
   b. Sioux Chief Manufacturing Company, Inc.
   c. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.
   d. Watts Industries, Inc.; Water Products Div.
2. Standard: ASSE 1018.
3. Pressure Rating: 125 psig minimum.
4. Body: Bronze.
5. Inlet and Outlet Connections: NPS 1/2 threaded, union, or solder joint.
6. Gravity Drain Outlet Connection: NPS 1/2 threaded or solder joint.
7. Finish: Chrome plated, or rough bronze for units used with pipe or tube that is not chrome finished.

2.12 TRAP-SEAL PRIMER SYSTEMS

A. Trap-Seal Primer Systems:
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   a. PPP Inc.
2. Standard: ASSE 1044,
3. Piping: NPS 3/4, ASTM B 88, Type L; copper, water tubing.
4. Cabinet: Surface-mounting steel box with stainless-steel cover.

5. Electric Controls: 24-hour timer, solenoid valve, and manual switch for 120-V ac power.
6. Vacuum Breaker: ASSE 1001.
7. Size Outlets: NPS 1/2.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Division 22 Section "Common Work Results for Plumbing" for piping joining materials, joint construction, and basic installation requirements.

B. Install backflow preventers in each water supply to mechanical equipment and systems and to other equipment and water systems that may be sources of contamination. Comply with authorities having jurisdiction.

1. Locate backflow preventers in same room as connected equipment or system.

2. Install drain for backflow preventers with atmospheric-vent drain connection with air-gap fitting, fixed air-gap fitting, or equivalent positive pipe separation of at least two pipe diameters in drain piping and pipe to floor drain. Locate air-gap device attached to or under backflow preventer. Simple air breaks are not acceptable for this application.

3. Do not install bypass piping around backflow preventers.

C. Install water regulators with inlet and outlet shutoff valves. Install pressure gages on inlet and outlet.

D. Install water control valves with inlet and outlet shutoff valves. Install pressure gages on inlet and outlet.

E. Install balancing valves in locations where they can easily be adjusted.

F. Install temperature-actuated water mixing valves with check stops or shutoff valves on inlets and with shutoff valve on outlet.

1. Install thermometers and water regulators if specified.

2. Install cabinet-type units recessed in or surface mounted on wall as specified.

G. Install Y-pattern strainers for water on supply side of each water pressure-reducing valve, solenoid valve, and pump.

H. Install outlet boxes recessed in wall. Install 2-by-4-inch fire-retardant-treated-wood blocking wall reinforcement between studs. Fire-retardant-treated-wood blocking is specified in Division 06 Section "Rough Carpentry."

I. Install water hammer arresters in water piping according to PDI-WH 201.

J. Install air vents at high points of water piping.

K. Install supply-type, trap-seal primer valves with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust valve for proper flow.

L. Install drainage-type, trap-seal primer valves as lavatory trap with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting.

M. Install trap-seal primer systems with outlet piping pitched down toward drain trap a minimum of 1 percent, and connect to floor-drain body, trap, or inlet fitting. Adjust system for proper flow.

3.2 CONNECTIONS

A. Piping installation requirements are specified in other Division 22 Sections. Drawings indicate general arrangement of piping and specialties.

B. Ground equipment according to Division 26 Section "Grounding and Bonding for Electrical Systems."

C. Connect wiring according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

3.3 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:

1. Intermediate atmospheric-vent backflow preventers.
2. Reduced-pressure-principle backflow preventers.
3. Double-check backflow-prevention assemblies.
4. Carbonated-beverage-machine backflow preventers.
5. Dual-check-valve backflow preventers.
6. Water pressure-reducing valves.
7. Calibrated balancing valves.
8. Primary, thermostatic, water mixing valves.
9. Manifold, thermostatic, water-mixing-valve assemblies.
10. Outlet boxes.
11. Trap-seal primer systems.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Division 22 Section "Identification for Plumbing Piping and Equipment."

3.4 FIELD QUALITY CONTROL

A. Perform the following tests and prepare test reports:

1. Test each reduced-pressure-principle backflow preventer assembly according to authorities having jurisdiction and the device's reference standard.

B. Remove and replace malfunctioning domestic water piping specialties and retest as specified above.

3.5 ADJUSTING

A. Set field-adjustable pressure set points of water pressure-reducing valves.

B. Set field-adjustable flow set points of balancing valves.

C. Set field-adjustable temperature set points of temperature-actuated water mixing valves.

END OF SECTION 22 11 19

SECTION 22 13 16 - SANITARY WASTE AND VENT PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. All equipment, accessories, etc. shall comply with the Buy America Act. Sub-Contractor shall coordinate with General Contractor for specific requirements.

1.2 SUMMARY

A. Section Includes:

1. Pipe, tube, and fittings.

1.3 PERFORMANCE REQUIREMENTS

A. Components and installation shall be capable of withstanding the following minimum working pressure unless otherwise indicated:

1. Soil, Waste, and Vent Piping: 10-foot head of water (30 kPa).

B. Seismic Performance: Soil, waste, and vent piping and support and installation shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: For sovent drainage system. Include plans, elevations, sections, and details.

1.5 INFORMATIONAL SUBMITTALS

A. Seismic Qualification Certificates: For waste and vent piping, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.

2. Detailed description of piping anchorage devices on which the certification is based and their installation requirements.

B. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Piping materials shall bear label, stamp, or other markings of specified testing agency.

B. Comply with NSF/ANSI 14, "Plastics Piping Systems Components and Related Materials," for plastic piping components. Include marking with "NSF-dwv" for plastic drain, waste, and vent piping and "NSF-sewer" for plastic sewer piping.

C. All cast iron soil pipe and fittings shall be marked with the collective trademark of the Cast Iron Soil Pipe Institute (CISPI) and be listed by NSF International.

PART 2 - PRODUCTS

2.1 PIPING MATERIALS

A. Comply with requirements in "Piping Schedule" Article for applications of pipe, tube, fitting materials, and joining methods for specific services, service locations, and pipe sizes.

2.2 HUB-AND-SPIGOT, CAST-IRON SOIL PIPE AND FITTINGS IN ALL PLENUM AREAS.

A. Pipe and Fittings: ASTM A 74, Service class(es).

B. Gaskets: ASTM C 564, rubber.

2.3 HUBLESS, CAST-IRON SOIL PIPE AND FITTINGS (ALL KITCHEN SANITARY PIPE)

A. Pipe and Fittings: Per CISPI 301.

B. Sovent Stack Fittings: ASME B16.45 or ASSE 1043, hubless, cast-iron aerator and deaerator drainage fittings.

C. Heavy-Duty, Hubless-Piping Couplings:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. ANACO-Husky.

b. Clamp-All Corp.

c. MIFAB, Inc.

d. Mission Rubber Company; a division of MCP Industries, Inc.

2. Standards: ASTM C 1277 and ASTM C 1540.

3. Description: Stainless-steel shield with stainless-steel bands and tightening devices; and ASTM C 564, rubber sleeve with integral, center pipe stop.

2.4 PVC PIPE AND FITTINGS

A. Solid-Wall PVC Pipe: ASTM D 2665, drain, waste, and vent.

B. PVC Socket Fittings: ASTM D 2665, made to ASTM D 3311, drain, waste, and vent patterns and to fit Schedule 40 pipe.

C. Adhesive Primer: ASTM F 656.

1. Adhesive primer shall have a VOC content of 550 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Adhesive primer shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

D. Solvent Cement: ASTM D 2564.

1. PVC solvent cement shall have a VOC content of 510 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Solvent cement shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 3 - EXECUTION

3.1 EARTH MOVING

A. Comply with requirements for excavating, trenching, and backfilling specified in Section 312000 "Earth Moving."

3.2 PIPING INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on coordination drawings.

B. Install piping in concealed locations unless otherwise indicated and except in equipment rooms and service areas.

C. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

D. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

E. Install piping at indicated slopes.

F. Install piping free of sags and bends.

G. Install fittings for changes in direction and branch connections.

H. Install piping to allow application of insulation.

I. Install seismic restraints on piping. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

J. Make changes in direction for soil and waste drainage and vent piping using appropriate branches, bends, and long-sweep bends. Sanitary tees and short-sweep 1/4 bends may be used on vertical stacks if change in direction of flow is from horizontal to vertical. Use long-turn, double Y-branch and 1/8-bend fittings if two fixtures are installed back to back or side by side with common drain pipe. Straight tees, elbows, and crosses may be used on vent lines. Do not change direction of flow more than 90 degrees. Use proper size of standard increasers and reducers if pipes of different sizes are connected. Reducing size of drainage piping in direction of flow is prohibited.

K. Lay buried building drainage piping beginning at low point of each system. Install true to grades and alignment indicated, with unbroken continuity of invert. Place hub ends of piping upstream. Install required gaskets according to manufacturer's written instructions for use of lubricants, cements, and other installation requirements. Maintain swab in piping and pull past each joint as completed.

L. Install soil and waste drainage and vent piping at the following minimum slopes unless otherwise indicated:

1. Building Sanitary Drain: 2 percent downward in direction of flow for piping NPS 3 (DN 80) and smaller; 1 percent downward in direction of flow for piping NPS 4 (DN 100) and larger.

2. Horizontal Sanitary Drainage Piping: 2 percent downward in direction of flow.

3. Vent Piping: 1 percent down toward vertical fixture vent or toward vent stack.

M. Install cast-iron soil piping according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook," Chapter IV, "Installation of Cast Iron Soil Pipe and Fittings."

1. Install encasement on underground piping according to ASTM A 674 or AWWA C105/A 21.5.

N. Install aboveground copper tubing according to CDA's "Copper Tube Handbook."

O. Install aboveground PVC piping according to ASTM D 2665.

P. Install underground PVC piping according to ASTM D 2321.

Q. Install engineered soil and waste drainage and vent piping systems as follows:

1. Combination Waste and Vent: Comply with standards of authorities having jurisdiction.

2. Sovent Drainage System: Comply with ASSE 1043 and sovent fitting manufacturer's written installation instructions.

R. Plumbing Specialties:

1. Install backwater valves in sanitary waster gravity-flow piping. Comply with requirements for backwater valves specified in Section 221319 "Sanitary Waste Piping Specialties."

2. Install cleanouts at grade and extend to where building sanitary drains connect to building sanitary sewers in sanitary drainage gravity-flow piping. Install cleanout fitting with closure plug inside the building in sanitary drainage force-main piping. Comply with requirements for cleanouts specified in Section 221319 "Sanitary Waste Piping Specialties."

S. Do not enclose, cover, or put piping into operation until it is inspected and approved by authorities having jurisdiction.

T. Install sleeves for piping penetrations of walls, ceilings, and floors. Comply with requirements for sleeves specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

U. Install sleeve seals for piping penetrations of concrete walls and slabs. Comply with requirements for sleeve seals specified in Section 220517 "Sleeves and Sleeve Seals for Plumbing Piping."

V. Install escutcheons for piping penetrations of walls, ceilings, and floors. Comply with requirements for escutcheons specified in Section 220518 "Escutcheons for Plumbing Piping."

3.3 JOINT CONSTRUCTION

A. Join hub-and-spigot, cast-iron soil piping with gasket joints according to CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for compression joints.

B. Join hubless, cast-iron soil piping according to CISPI 310 and CISPI's "Cast Iron Soil Pipe and Fittings Handbook" for hubless-piping coupling joints.

C. Join copper tube and fittings with soldered joints according to ASTM B 828. Use ASTM B 813, water-flushable, lead-free flux and ASTM B 32, lead-free-alloy solder.

D. Plastic, Nonpressure-Piping, Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.

2. PVC Piping: Join according to ASTM D 2855 and ASTM D 2665 Appendixes.

3.4 HANGER AND SUPPORT INSTALLATION

A. Comply with requirements for seismic-restraint devices specified in Section 220548 "Vibration and Seismic Controls for Plumbing Piping and Equipment."

B. Comply with requirements for pipe hanger and support devices and installation specified in Section 220529 "Hangers and Supports for Plumbing Piping and Equipment."

C. Support vertical piping and tubing at base and at each floor.

D. Rod diameter may be reduced one size for double-rod hangers, with 3/8-inch (10-mm) minimum rods.

E. Install hangers for cast-iron soil piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 60 inches with 3/8-inch rod.

2. NPS 3 (DN 80): 60 inches (1500 mm) with 1/2-inch rod.

3. NPS 4 and NPS 5: 60 inches with 5/8-inch rod.

4. NPS 6 and NPS 8: 60 inches with 3/4-inch rod.

5. NPS 10 and NPS 12: 60 inches with 7/8-inch rod.

6. Spacing for 10-foot lengths may be increased to 10 feet. Spacing for fittings is limited to 60 inches.

F. Install supports for vertical cast-iron soil piping every 15 feet .

G. Install hangers for copper tubing with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/4 : 72 inches with 3/8-inch rod.
2. NPS 1-1/2 and NPS 2 : 96 inches with 3/8-inch rod.

H. Install supports for vertical copper tubing every 10 feet.

I. Install hangers for PVC piping with the following maximum horizontal spacing and minimum rod diameters:

1. NPS 1-1/2 and NPS 2: 48 inches with 3/8-inch rod.
2. NPS 3 (DN 80): 48 inches with 1/2-inch rod.
3. NPS 4 and NPS 5: 48 inches with 5/8-inch rod.
4. NPS 6 and NPS 8: 48 inches with 3/4-inch rod.
5. NPS 10 and NPS 12: 48 inches with 7/8-inch rod.

J. Install supports for vertical PVC piping every 48 inches.

K. Support piping and tubing not listed above according to MSS SP-69 and manufacturer's written instructions.

3.5 CONNECTIONS

A. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Connect drainage and vent piping to the following:

1. Plumbing Fixtures: Connect drainage piping in sizes indicated, but not smaller than required by plumbing code.
2. Plumbing Fixtures and Equipment: Connect atmospheric vent piping in sizes indicated, but not smaller than required by authorities having jurisdiction.
3. Plumbing Specialties: Connect drainage and vent piping in sizes indicated, but not smaller than required by plumbing code.
4. Install test tees (wall cleanouts) in conductors near floor and floor cleanouts with cover flush with floor.
5. Equipment: Connect drainage piping as indicated. Provide shutoff valve if indicated and union for each connection. Use flanges instead of unions for connections NPS 2-1/2 (DN 65) and larger.

3.6 IDENTIFICATION

A. Identify exposed sanitary waste and vent piping. Comply with requirements for identification specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.7 FIELD QUALITY CONTROL

A. During installation, notify authorities having jurisdiction at least 24 hours before inspection must be made. Perform tests specified below in presence of authorities having jurisdiction.

1. Roughing-in Inspection: Arrange for inspection of piping before concealing or closing-in after roughing-in and before setting fixtures.
2. Final Inspection: Arrange for final inspection by authorities having jurisdiction to observe tests specified below and to ensure compliance with requirements.

B. Reinspection: If authorities having jurisdiction find that piping will not pass test or inspection, make required corrections and arrange for reinspection.

C. Reports: Prepare inspection reports and have them signed by authorities having jurisdiction.

D. Test sanitary drainage and vent piping according to procedures of authorities having jurisdiction or, in absence of published procedures, as follows:

1. Leave uncovered and unconcealed new, altered, extended, or replaced drainage and vent piping until it has been tested and approved. Expose work that was covered or concealed before it was tested.
2. Roughing-in Plumbing Test Procedure: Test drainage and vent piping except outside leaders on completion of roughing-in. Close openings in piping system and fill with water to point of overflow, but not less than 10-foot head of water. From 15 minutes before inspection starts to completion of inspection, water level must not drop. Inspect joints for leaks.
3. Finished Plumbing Test Procedure: After plumbing fixtures have been set and traps filled with water, test connections and prove they are gastight and watertight. Plug vent-stack openings on roof and building drains where they leave building. Introduce air into piping system equal to pressure of 1-inch wg. Use U-tube or manometer inserted in trap of water closet to measure this pressure. Air pressure must remain constant without introducing additional air throughout period of inspection. Inspect plumbing fixture connections for gas and water leaks.
4. Repair leaks and defects with new materials and retest piping, or portion thereof, until satisfactory results are obtained.
5. Prepare reports for tests and required corrective action.

3.8 CLEANING AND PROTECTION

A. Clean interior of piping. Remove dirt and debris as work progresses.

B. Protect drains during remainder of construction period to avoid clogging with dirt and debris and to prevent damage from traffic and construction work.

C. Place plugs in ends of uncompleted piping at end of day and when work stops.

D. Exposed PVC Piping: Protect plumbing vents exposed to sunlight with two coats of water-based latex paint.

3.9 PIPING SCHEDULE

A. Aboveground, soil and waste piping shall be one of the following:

1. Hubless, cast-iron soil pipe and fittings, heavy-duty hubless-piping couplings; and coupled joints.

2. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

B. Aboveground, vent piping shall be one of the following:

1. Hubless, cast-iron soil pipe and fittings; heavy-duty hubless-piping couplings; and coupled joints.

2. Solid-wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

C. Underground, soil, waste, and vent piping shall be one of the following:

1. Service class, cast-iron soil piping; gaskets; and gasketed joints.

2. Solid wall PVC pipe, PVC socket fittings, and solvent-cemented joints.

END OF SECTION 22 13 16

SECTION 22 13 19 - SANITARY WASTE PIPING SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. All equipment, accessories, etc. shall comply with the Buy America Act. Sub-Contractor shall coordinate with General Contractor for specific requirements.

1.2 SUMMARY

A. Section Includes:

1. Cleanouts.
2. Floor drains.
3. Trench drains.
4. Miscellaneous sanitary drainage piping specialties.
5. Grease interceptors.
6. Oil interceptors.

B. Related Requirements:

1. Section 221423 "Storm Drainage Piping Specialties" for storm drainage piping inside the building, drainage piping specialties, and drains.
2. Section 224000 “Plumbing Fixtures” for hair interceptors
3. Section 224300 "Medical Plumbing Fixtures" for plaster sink interceptors.

1.3 DEFINITIONS

A. ABS: Acrylonitrile-butadiene-styrene plastic.

B. FOG: Fats, oils, and greases.

C. FRP: Fiberglass-reinforced plastic.

D. HDPE: High-density polyethylene plastic.

E. PE: Polyethylene plastic.

F. PP: Polypropylene plastic.

G. PVC: Polyvinyl chloride plastic.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include rated capacities, operating characteristics, and accessories for the following:

1. Grease interceptors.

2. Oil interceptors.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For drainage piping specialties to include in emergency, operation, and maintenance manuals.

1.6 QUALITY ASSURANCE

A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NSF 14, "Plastics Piping Components and Related Materials," for plastic sanitary piping specialty components.

1.7 COORDINATION

A. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Section 033000 "Cast-in-Place Concrete."

B. Coordinate size and location of roof penetrations.

PART 2 - PRODUCTS

2.1 CLEANOUTS

A. Metal Cleanouts:

1. ASME A112.36.2M, Cast-Iron Cleanouts:

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Josam Company.

2) Smith, Jay R. Mfg. Co.

3) Watts Drainage Products.

4) Zurn Plumbing Products Group.

B. Floor Cleanouts:

1. ASME A112.36.2M, Cast-Iron Cleanouts. Provide with recessed top for matching to surrounding floor finish.

a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1) Josam Company.

2) Smith, Jay R. Mfg. Co.

3) Watts Drainage Products.

4) Zurn Plumbing Products Group.

2.2 FLOOR DRAINS

A. Cast-Iron Floor Drains:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Josam Company; Josam Div.

b. Smith, Jay R. Mfg. Co.

c. Tyler Pipe; Wade Div.

d. Watts Drainage Products.

e. Zurn Plumbing Products Group; Light Commercial Operation.

2.3 TRENCH DRAINS

A. Trench Drains :

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Josam Company; Josam Div.

b. Smith, Jay R. Mfg. Co.; Division of Smith Industries, Inc.

c. Tyler Pipe; Wade Div.

d. Watts Drainage Products Inc.

e. Zurn Plumbing Products Group; Specification Drainage Operation.

2.4 MISCELLANEOUS SANITARY DRAINAGE PIPING SPECIALTIES

A. Deep-Seal Traps :

1. Description: Cast-iron or bronze casting, with inlet and outlet matching connected piping and cleanout trap-seal primer valve connection.

B. Floor-Drain, Trap-Seal Primer Fittings :

1. Description: Cast iron, with threaded inlet and threaded or spigot outlet, and trap-seal primer valve connection.

2. Size: Same as floor drain outlet with NPS 1/2 side inlet.

C. Air-Gap Fittings :

1. Standard: ASME A112.1.2, for fitting designed to ensure fixed, positive air gap between installed inlet and outlet piping.

2.5 GREASE INTERCEPTORS

A. Grease Interceptors :

1. Cast-Iron or Steel Grease Interceptors:
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1) Watts Drainage Products.
      2) Zurn Plumbing Products Group.
2. Plastic Grease Interceptors:
   a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1) Schier Products Company.
      2) Zurn Plumbing Products Group.
      3) Green Turtle.

2.6 OIL INTERCEPTORS

A. Oil Interceptors:
   1. Cast-Iron or Steel Oil Interceptors:
      a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
         1) Green Turtle.
         2) Zurn Plumbing Products Group
         3) Smith, Jay R. Mfg. Co.
         4) Josam Company.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Refer to Section 220500 “Common Work Results for Plumbing” for piping joining materials, joint construction, and basic installation requirements.

B. Install cleanouts in aboveground piping and building drain piping according to the following, unless otherwise indicated:
   1. Size same as drainage piping up to NPS 4. Use NPS 4 for larger drainage piping unless larger cleanout is indicated.
   2. Locate at each change in direction of piping greater than 45 degrees.
   3. Locate at minimum intervals of 50 feet (15 m) for piping NPS 4 (DN 100) and smaller and 100 feet (30 m) for larger piping.
   4. Locate at base of each vertical soil and waste stack.

C. For floor cleanouts for piping below floors, install cleanout deck plates with top flush with finished floor.

D. For cleanouts located in concealed piping, install cleanout wall access covers, of types indicated, with frame and cover flush with finished wall.

E. Install floor drains at low points of surface areas to be drained. Set grates of drains flush with finished floor, unless otherwise indicated.

1. Position floor drains for easy access and maintenance.

2. Set floor drains below elevation of surrounding finished floor to allow floor drainage. Set with grates depressed according to the following drainage area radii:

a. Radius, 30 Inches or Less: Equivalent to 1 percent slope, but not less than 1/4-inch total depression.

b. Radius, 30 to 60 Inches: Equivalent to 1 percent slope.

c. Radius, 60 Inches or Larger: Equivalent to 1 percent slope, but not greater than 1-inch total depression.

3. Install floor-drain flashing collar or flange so no leakage occurs between drain and adjoining flooring. Maintain integrity of waterproof membranes where penetrated.

4. Install individual traps for floor drains connected to sanitary building drain, unless otherwise indicated.

F. Install trench drains at low points of surface areas to be drained. Set grates of drains flush with finished surface, unless otherwise indicated.

G. Install deep-seal traps on floor drains and other waste outlets, if indicated.

H. Install floor-drain, trap-seal primer fittings on inlet to floor drains that require trap-seal primer connection.

1. Exception: Fitting may be omitted if trap has trap-seal primer connection.

2. Size: Same as floor drain inlet.

I. Install air-gap fittings on draining-type backflow preventers and on indirect-waste piping discharge into sanitary drainage system.

J. Install grease interceptors, including trapping, venting, and flow-control fitting, according to authorities having jurisdiction and with clear space for servicing.

1. Above-Floor Installation: Set unit with bottom resting on floor, unless otherwise indicated.

2. Flush with Floor Installation: Set unit and extension, if required, with cover flush with finished floor.

3. Recessed Floor Installation: Set unit in receiver housing having bottom or cradle supports, with receiver housing cover flush with finished floor.

4. Install cleanout immediately downstream from interceptors not having integral cleanout on outlet.

K. Install oil interceptors, including trapping, venting, and flow-control fitting, according to authorities having jurisdiction and with clear space for servicing. Coordinate oil-interceptor storage tank and gravity drain with Section 231113 "Facility Fuel-Oil Piping."

L. Install wood-blocking reinforcement for wall-mounting-type specialties.

M. Install traps on plumbing specialty drain outlets. Omit traps on indirect wastes unless trap is indicated.

N. Install escutcheons at wall, floor, and ceiling penetrations in exposed finished locations and within cabinets and millwork. Use deep-pattern escutcheons if required to conceal protruding pipe fittings.

3.2 CONNECTIONS

A. Comply with requirements in Section 221316 "Sanitary Waste and Vent Piping" for piping installation requirements. Drawings indicate general arrangement of piping, fittings, and specialties.

B. Install piping adjacent to equipment to allow service and maintenance.

C. Grease Interceptors: Connect inlet and outlet to unit, and connect flow-control fitting and vent to unit inlet piping. Install valve on outlet of automatic drawoff-type unit.

D. Oil Interceptors: Connect inlet, outlet, vent, and gravity drawoff piping to unit; flow-control fitting and vent to unit inlet piping; and gravity drawoff and suction piping to oil storage tank.

E. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

F. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

3.3 LABELING AND IDENTIFYING

A. Equipment Nameplates and Signs: Install engraved plastic-laminate equipment nameplate or sign on or near each of the following:

1. Grease interceptors.
2. Oil interceptors.
3. Solids interceptors.

B. Distinguish among multiple units, inform operator of operational requirements, indicate safety and emergency precautions, and warn of hazards and improper operations, in addition to identifying unit. Nameplates and signs are specified in Section 220553 "Identification for Plumbing Piping and Equipment."

3.4 PROTECTION

A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 22 13 19

SECTION 22 42 13.13 - COMMERCIAL WATER CLOSETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:
   1. Water closets.
   2. Flushometer valves.
   3. Toilet seats.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.
   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for water closets.
   2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For flushometer valves and electronic sensors to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 WATER CLOSETS

A. Water Closets
   1. Basis-of-Design Product: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work are limited to::
      a. American Standard America.
      b. TOTO USA, INC.
      c. Kohler Co.

2.2 FLUSHOMETER VALVES

A. Flushometer Valves:
1. Basis-of-Design Product: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work are limited to:
a. Zurn Industries, LLC; Commercial Brass and Fixtures.
b. Toto USA, Inc.
c. Sloan Valve Company.

2.3 TOILET SEATS

A. Toilet Seats:
1. Basis-of-Design Product: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work are limited to:
a. American Standard America.
b. Church Seats.
c. Kohler Co.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before water-closet installation.

B. Examine walls and floors for suitable conditions where water closets will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Water-Closet Installation:
1. Install level and plumb according to roughing-in drawings.
2. Install floor-mounted water closets on bowl-to-drain connecting fitting attachments to piping or building substrate.
3. Install accessible, wall-mounted water closets at mounting height for handicapped/elderly, according to ICC/ANSI A117.1.

B. Support Installation:
1. Install supports, affixed to building substrate, for floor-mounted, back-outlet water closets.
2. Use carrier supports with waste-fitting assembly and seal.

3. Install floor-mounted, back-outlet water closets attached to building floor substrate, onto waste-fitting seals; and attach to support.
4. Install wall-mounted, back-outlet water-closet supports with waste-fitting assembly and waste-fitting seals; and affix to building substrate.

C. Flushometer-Valve Installation:
1. Install flushometer-valve, water-supply fitting on each supply to each water closet.
2. Attach supply piping to supports or substrate within pipe spaces behind fixtures.
3. Install lever-handle flushometer valves for accessible water closets with handle mounted on open side of water closet.
4. Install actuators in locations that are easy for people with disabilities to reach.
5. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

D. Install toilet seats on water closets.

E. Wall Flange and Escutcheon Installation:
1. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations and within cabinets and millwork.
2. Install deep-pattern escutcheons if required to conceal protruding fittings.
3. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

F. Joint Sealing:
1. Seal joints between water closets and walls and floors using sanitary-type, one-part, mildew-resistant silicone sealant.
2. Match sealant color to water-closet color.
3. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

3.3 CONNECTIONS

A. Connect water closets with water supplies and soil, waste, and vent piping. Use size fittings required to match water closets.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

D. Where installing piping adjacent to water closets, allow space for service and maintenance.

3.4 ADJUSTING

A. Operate and adjust water closets and controls. Replace damaged and malfunctioning water closets, fittings, and controls.

B. Adjust water pressure at flushometer valves to produce proper flow.

C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

A. Clean water closets and fittings with manufacturers' recommended cleaning methods and materials.

B. Install protective covering for installed water closets and fittings.

C. Do not allow use of water closets for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 42 13.13

SECTION 22 42 16.13 - COMMERCIAL LAVATORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. All equipment, accessories, etc. shall comply with the Buy America Act. Sub-Contractor shall coordinate with General Contractor for specific requirements.

1.2 SUMMARY

A. Section Includes:

1. Lavatories.
2. Shampoo bowls.
3. Faucets.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for lavatories.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

B. Shop Drawings: Include diagrams for power, signal, and control wiring of automatic faucets.

1.4 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For lavatories and faucets to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 LAVATORIES

A. Lavatory.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. Sloan
b. American Standard America.
c. Kohler Co.
d. Zurn Industries, LLC; Commercial Brass and Fixtures.

2.2 LAVATORY FAUCETS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet materials that will be in contact with potable water.

B. Lavatory Faucets.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. Sloan
b. American Standard America.
c. Kohler Co.
d. Zurn Industries, LLC; Commercial Brass and Fixtures.

2.3 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated-brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated-brass or stainless-steel wall flange.

D. Supply Stops: Chrome-plated-brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping. Stops to have brass valve stems, plastic is not acceptable.

E. Operation: Loose key.

F. Risers:

1. NPS 3/8.

2. Chrome-plated, rigid-copper-pipe and brass straight or offset tailpieces or chrome-plated, soft-copper flexible tube riser.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before lavatory installation.

B. Examine counters and walls for suitable conditions where lavatories will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install lavatories level and plumb according to roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-mounted lavatories.

C. Install accessible wall-mounted lavatories at handicapped/elderly mounting height for people with disabilities or the elderly, according to ICC/ANSI A117.1.

D. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

E. Seal joints between lavatories, counters, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

F. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible lavatories. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

3.3 CONNECTIONS

A. Connect fixtures with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust lavatories and controls. Replace damaged and malfunctioning lavatories, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

C. Install fresh batteries in battery-powered, electronic-sensor mechanisms.

3.5 CLEANING AND PROTECTION

A. After completing installation of lavatories, inspect and repair damaged finishes.

B. Clean lavatories, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed lavatories and fittings.

D. Do not allow use of lavatories for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 42 16.13

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SECTION 22 42 16.16 - COMMERCIAL SINKS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. All equipment, accessories, etc. shall comply with the Buy America Act. Sub-Contractor shall coordinate with General Contractor for specific requirements.

1.2 SUMMARY

A. Section Includes:

1. Service basins.
2. Service sinks.
3. Utility sinks.
4. Handwash sinks.
5. Sacristy sinks.
6. Sink faucets.
7. Supply fittings.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for sinks.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

1.4 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sinks to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 SERVICE BASINS

A. Service Basins: Terrazzo, floor mounted.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   a. Sloan
   b. American Standard America.
   c. Kohler Co.
   d. Zurn Industries, LLC; Commercial Brass and Fixtures.

B. Service Basins : Plastic, floor mounted.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

a. Sloan
b. American Standard America.
c. Kohler Co.
d. Zurn Industries, LLC; Commercial Brass and Fixtures.

2.2 SERVICE SINKS

A. Service Sinks : Enameled, cast iron, trap standard mounted.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
a. Sloan
b. American Standard America.
c. Kohler Co.
d. Zurn Industries, LLC; Commercial Brass and Fixtures.

2.3 SINKS

A. Sinks: Stainless steel.

1. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
a. Sloan
b. American Standard America.
c. Kohler Co.
d. Zurn Industries, LLC; Commercial Brass and Fixtures.

2.4 SINK FAUCETS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for faucet-spout materials that will be in contact with potable water.

B. Sink Faucets.

1. Faucets.

a. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
b. Sloan
c. American Standard America.
d. Kohler Co.
e. Zurn Industries, LLC; Commercial Brass and Fixtures.

2.5 SUPPLY FITTINGS

A. NSF Standard: Comply with NSF/ANSI 61, "Drinking Water System Components - Health Effects," for supply-fitting materials that will be in contact with potable water.

B. Standard: ASME A112.18.1/CSA B125.1.

C. Supply Piping: Chrome-plated brass pipe or chrome-plated copper tube matching water-supply piping size. Include chrome-plated brass or stainless-steel wall flange.

D. Supply Stops: Chrome-plated brass, one-quarter-turn, ball-type or compression valve with inlet connection matching supply piping. Stops to have brass valve stems, plastic is not acceptable.

E. Operation: Loose key.

F. Risers:

1. NPS 3/8

2. Chrome-plated, rigid-copper pipe or chrome-plated, soft-copper flexible tube.

2.6 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine roughing-in of water supply and sanitary drainage and vent piping systems to verify actual locations of piping connections before sink installation.

B. Examine walls, floors, and counters for suitable conditions where sinks will be installed.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install sinks level and plumb according to roughing-in drawings.

B. Install supports, affixed to building substrate, for wall-hung sinks.

C. Install accessible wall-mounted sinks at handicapped/elderly mounting height according to ICC/ANSI A117.1.

D. Set floor-mounted sinks in leveling bed of cement grout.

E. Install water-supply piping with stop on each supply to each sink faucet.

1. Exception: Use ball, gate, or globe valves if supply stops are not specified with sink. Comply with valve requirements specified in Section 22 "General-Duty Valves for Plumbing Piping."

2. Install stops in locations where they can be easily reached for operation.

F. Install wall flanges or escutcheons at piping wall penetrations in exposed, finished locations. Use deep-pattern escutcheons if required to conceal protruding fittings. Comply with escutcheon requirements specified in Section 220518 "Escutcheons for Plumbing Piping."

G. Seal joints between sinks and counters, floors, and walls using sanitary-type, one-part, mildew-resistant silicone sealant. Match sealant color to fixture color. Comply with sealant requirements specified in Section 079200 "Joint Sealants."

H. Install protective shielding pipe covers and enclosures on exposed supplies and waste piping of accessible sinks. Comply with requirements in Section 220719 "Plumbing Piping Insulation."

3.3 CONNECTIONS

A. Connect sinks with water supplies, stops, and risers, and with traps, soil, waste, and vent piping. Use size fittings required to match fixtures.

B. Comply with water piping requirements specified in Section 221116 "Domestic Water Piping."

C. Comply with soil and waste piping requirements specified in Section 221316 "Sanitary Waste and Vent Piping."

3.4 ADJUSTING

A. Operate and adjust sinks and controls. Replace damaged and malfunctioning sinks, fittings, and controls.

B. Adjust water pressure at faucets to produce proper flow.

3.5 CLEANING AND PROTECTION

A. After completing installation of sinks, inspect and repair damaged finishes.

B. Clean sinks, faucets, and other fittings with manufacturers' recommended cleaning methods and materials.

C. Provide protective covering for installed sinks and fittings.

D. Do not allow use of sinks for temporary facilities unless approved in writing by Owner.

END OF SECTION 22 42 16.16

SECTION 23 00 00 – MECHANICAL SUMMARY OF WORK

PART 1 - GENERAL

1.1 PRIMARY CONSTRUCTION CODES AND STANDARDS

a. Florida Building Code 6th Edition (2017)
b. Florida Building Code: Mechanical 6th Edition (2017)
c. Florida Building Code: Energy Conservation 6th Edition (2017)
d. Florida Building Code: Plumbing 6th Edition (2017)
e. ASHRAE 62.1-2013
f. ASHRAE 90.1-2016
g. ASHRAE 15-2013
h. SMACNA

1.2 CONSTRUCTION CRITERIA

A. Climate Design Criteria (ASHRAE Handbook – Fundamentals (2017)

1. Summer Outside:

   a. 93.9°F DB
   b. 77.5°F WB

2. Winter Outside:

   a. 30°F DB

3. ASHRAE Climate Zone: 2A

B. Envelope Design Criteria:

1. Walls:
   a. Mass Walls: R-5.7 continuous insulation
   b. Metal Framed Walls: R-13 insulation between framing

2. Roof: R-25 continuous insulation

3. Glazing

   a. Windows: U-0.5 SHGC-0.25
   b. Skylights: U-0.65 SHGC-0.35

C. Building Occupancy Schedule:

1. It is understood that this facility will sustain 24/7 operation.

D. Indoor Design Criteria:

1. Offices: Cooling

   a. Occupied: 74°F
   b. Unoccupied: 80°F

2. Offices: Heating

   a. Occupied: 70°F
   b. Unoccupied: 60°F

3. Holdrooms: Cooling

   a. Occupied: 72°F
   b. Unoccupied: 80°F

4. Holdrooms: Heating

   a. Occupied: 72°F
   b. Unoccupied: 60°F

5. Electrical/Mechanical Rooms: Cooling

   a. Occupied: 78°F
   b. Unoccupied: 78°F

6. IDF/MDF Spaces: Cooling

   a. Occupied: 74°F
   b. Unoccupied: 74°F

7. Concession Spaces: Cooling

   a. Occupied: 72°F
   b. Unoccupied: 80°F

8. Concession Spaces: Heating

   a. Occupied: 72°F
   b. Unoccupied: 60°F

9. Corridors: Cooling

a. Occupied: 72°F
b. Unoccupied: 80°F

10. Corridors: Heating

a. Occupied: 72°F
b. Unoccupied: 60°F

11. TSA/Security Checkpoints: Cooling

a. Occupied: 72°F
b. Unoccupied: 80°F

12. TSA/Security Checkpoints: Heating

a. Occupied: 72°F
b. Unoccupied: 60°F

E. Ventilation Requirements and Building Air Balance:

1. Ventilation outside Air shall be in accordance with ASHRAE 62.1.
2. The balance between outside air and exhaust air will result in a positively pressurized building when in occupied periods.

F. Filtration:

1. AHU's:

a. Pre-Filters: 4" 30% ASHRAE efficient filters (MERV 8)
b. Final Filters: 12" Cartridge 90% ASHRAE efficient filters (MERV 13)

2. FCU's:

a. Filters: 4" 30% ASHRAE efficient filters (MERV 8)

3. Filters shall be industry standard sizes.
4. Filter frames shall be galvanized sheet metal with spot welds or fully welded.

G. The new building is designed as an approximate 42,000 s.f. single story Airport Concourse facility with mechanical mezzanines. Preliminary load calculations have been conducted to determine rough HVAC equipment sizing. The total peak cooling load is anticipated to be approximately 250 tons.

H. Chilled water will be provided to the building via two 250-ton high efficiency air-cooled packaged chillers (15°F deltaT, 42°F CHWS) piped in parallel, located outside the building on grade, (Each Chiller shall be sized at 100% of peak load for N+1 redundancy.). Variable

flow primary pumping with two full size 400 GPM chilled water pumps (N+1) and associated variable frequency drives will provide chilled water to the building. Chilled water pumps will be located in the indoor mechanical mezzanine. Chiller Basis of Design: Trane RTAF

1. Chillers shall be specified with barrel heaters for freeze protection.
2. Chiller shall be specified with hail guards.
3. Chiller shall be specified with a sound-reduction package. Sound reduction package includes: acoustic enclosure around compressors, reduced-speed fans with acoustic treatment, and designing to reduce sound levels without affecting chiller performance.
4. Chilled water pumps shall be vertical inline split case type and provided with vibration isolation.
5. An Air/Dirt Separator, expansion tank, and chemical shot feeder shall be provided.

I. The Air Handling Units (AHU) shall be provided on the mechanical mezzanines and will condition the Office spaces, Hold Rooms, and TSA/Security Checkpoints. The AHUs shall have chilled water cooling coils and electric heating coils for single zone VAV units. VAV AHU's utilizing VAV terminal units for zone control will have electric re-heat within the VAV terminal units.

1. AHUs shall have the following configuration:

   a. Mixing box section
   b. Filter section with 4" pre-filters and 12" final-filters
   c. Access Section
   d. Chilled water coil.
   e. Access Section
   f. Electric Heating Coil
   g. Plenum supply fan array (Minimum 4 supply fans in array)
   h. Discharge Plenum

2. Solid Double wall construction (MFG guaranteed non-condensing thermal performance), set on concrete pad, with internal spring isolated fans (minimum 2" deflection spring isolation, and neoprene pad below.)
3. Coil shall be 12 FPI max.
4. Cooling coils shall be sized for 52 degree LAT.
5. Condensate drains shall be stainless steel.
6. Coil casings shall be stainless steel.
7. Control Dampers will have airfoil blades with blade seals.
8. Motors shall be provided with AEGIS shaft grounding rings, factory installed, for all motors served from VFD's.

J. Building Ventilation air shall be routed from exterior AMCA 540/550 wall louvers and induced into the return side of the AHU's. Outside air paths will be monitored by airflow monitoring stations (Ebtron Gold or approved equal) for airflow tracking and proper building pressure control.

K. Building general exhaust shall be provided by inline general exhaust fans located on the mechanical mezzanines above the restrooms. Additional exhaust shall be provided as necessary for building relief air. Exhaust air will terminate to an AMCA 540/550 louver on an exterior wall of the building.

L. Building Heating will be provided by electric duct heaters at each Single Zone VAV AHU supply duct main. For AHUs with VAV terminal units, electric reheat shall be provided at the terminals (VTUs), with SCR control, sized to meet building heating demands.

M. Temperature critical spaces which require continual cooling such as IT/Data rooms shall be provided with independent chilled water fan coil units (FCU) and a Split-DX backup system for redundancy.

N. Supply, return and outside air ductwork will be externally insulated galvanized steel when routed above ceilings, and would be double wall round if exposed. All ductwork to be insulated in concealed areas shall be fiber blanket type, all insulated ductwork exposed in mechanical spaces shall be rigid board insulation.

O. All ductwork shall be formed from galvanized steel and shall conform to the requirements of SMACNA's Duct Construction Standards, NFPA Standard 90A. All supply ductwork shall be externally wrapped with 2 inch fiberglass insulation with FSK vapor barrier. Return and exhaust ductwork shall be constructed per low pressure supply ductwork standards, except that they will not be insulated except as required by the International Energy Code. Fire dampers and combination fire/smoke dampers will be installed at all ductwork penetrations of rated fire and smoke walls/partitions and shafts as shown on the architectural floor plans. Seal all ductwork (supply, return and exhaust) in accordance with the International Energy Code. Do not use snap lock construction.

1. Low pressure ductwork will be designed from the terminal units (VTU) to the diffusers/grills, RA ductwork, and exhaust ductwork. Low pressure ductwork will be sized to deliver air at a friction pressure drop not to exceed 0.08"w.c. per 100' of duct. (i.e. Air Duct Calculator)
2. Medium pressure ductwork will be designed from the VAV AHU to the terminal units (VTU). Medium pressure ductwork will be sized to deliver air at a friction pressure drop not to exceed 0.2"w.c. per 100' of duct or no more than 2000 FPM (Max 1500 FPM in acoustic sensitive locations.). (i.e. Air Duct Calculator)

P. Exhaust ductwork shall be un-insulated galvanized steel.

Q. The complete air and water system will be tested, adjusted and balanced by an independent certified testing and balancing firm (NEBB or AABC) as required to ensure system performance in accordance with design criteria.

R. A direct digital control (DDC) building automation system (BAS) shall be provided. All HVAC mechanical devices will be interfaced with the BAS for control, monitoring and alarm. A

centrally located operator's computer workstation will be provided for BAS reference and adjustment. Siemens is the owner preferred controls manufacturer.

1. All air-handling units and other major equipment shall use DDC with stand-alone panels for each unit.
2. Provide Optimized start/stop scheduling, occupied/unoccupied set-points, Night set-back, Schedule control, Static pressure reset schedules, SA reset schedules, OA flow monitoring/control, Relief Airflow monitoring/control, VFD's on all fans other than small CV general exhaust.
3. All cooling and heating coils shall have Discharge air temperature sensors for monitoring performance.
4. Damper actuators shall be DDC.
5. Control valves shall be pressure independent Characterized ball control valves with stainless steel stems and balls.
6. Control sequences shall comply with ASHRAE 90.1.

S. UL555s Combination Fire Smoke Dampers, UL555 Fire Dampers, and UL555s Smoke Dampers shall be provided in accordance with FBC/FMC.

T. Air distribution shall be supplied through diffusers located in acoustical ceiling tile or drywall ceiling, at ceiling level. Ceiling return grilles shall transfer the supplied air to the return air system. It is anticipated that the following grilles/diffusers will be incorporated in the design.

1. 24x24 Lay-In Architectural Plaque Diffuser
2. 12x12 Surface Mounted Plaque Diffuser
3. 1 to 3 slot diffusers ¾" slot – (High Ceiling Areas / Perimeters)
4. Perforated Return Grilles
5. Louvered Return Grilles (i.e. Sidewall)
6. Louvered Supply Grilles (i.e. Sidewall)
7. Supply Nozzles (High Volume Spaces such as Hold Rooms and TSA/Security Checkpoints)

U. Intake Louvers sized for 500 FPM at free area, and exhaust louvers shall be sized for 750 FPM at free area. Louvers will be specified to be AMCA 540/550.

V. Chilled water and hot water piping shall be supplied to each AHU/Terminal unit through insulated piping sized for 4' per 100 linear feet of pipe pressure drop or a maximum of 8 feet per second water velocity. Chilled Water system shall be designed for 15°F Delta T. An air separator and expansion tank will be provided for air removal and system pressure regulation for each closed loop system. Chemical shot feeder shall be provided for CHW closed loop chemical treatment.

1. Air Vents will be high capacity ITT Bell & Gossett or Armstrong.
2. Control valves are to be two way, characterized ball style control valves, with stainless steel balls and stems.

3. Piping is to be welded schedule 40 steel or Type K Copper, 2-1/2” and larger. Grooved steel piping is also acceptable for 2-1/2” and larger.
4. Piping is to be soldered Type K copper 2” and smaller.
5. Chilled water piping shall be insulated with cellular glass foam insulation with all-service jacket. Piping located in the mechanical rooms shall be insulated with cellular glass foam insulation with PVC jacketing. Piping located outside shall be insulated with thicker cellular glass foam insulation with aluminum jacketing.

END OF SECTION 23 00 00

SECTION 23 00 10 - BASIC MECHANICAL REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

B. This specification section is applicable to all division 23 specification sections.

1.2 SUMMARY

A. Mechanical systems, equipment, devices and accessories shall be installed, finished, tested and adjusted for continuous and proper operation. Any apparatus, material or device not shown on the Drawings but mentioned in these Specifications, or vice versa, or any incidental accessories necessary to make the project complete and operational in all respects, shall be provided. Include all materials, equipment, supervision, operation, methods and labor for the fabrication, installation, start-up and tests necessary for complete and properly functioning systems.

1.3 MECHANICAL SYSTEMS DESCRIPTIONS

A. Basic Design Criteria

1. The following publications will be used as a reference for design of the mechanical systems:

   a. Florida Building Code 6th Edition (2017)
   b. Florida Building Code: Mechanical 6th Edition (2017)
   c. Florida Building Code: Energy Conservation 6th Edition (2017)
   d. Florida Building Code: Plumbing 6th Edition (2017)
   e. ASHRAE 62.1-2013
   f. ASHRAE 90.1-2016
   g. ASHRAE 15-2013
   h. SMACNA

B. Climate Design Criteria (ASHRAE Handbook – Fundamentals (2017)

1. Summer Outside:

   a. 93.9°F DB
   b. 77.5°F WB

2. Winter Outside:

a. 30°F DB

3. ASHRAE Climate Zone: 2A

C. Envelope Design Criteria:

1. Walls:
   a. Mass Walls: R-5.7 continuous insulation
   b. Metal Framed Walls: R-13 insulation between framing

2. Roof: R-25 continuous insulation

3. Glazing

   a. Windows: U-0.5 SHGC-0.25
   b. Skylights: U-0.65 SHGC-0.35

D. Building Occupancy Schedule:

1. It is understood that this facility will sustain 24/7 operation.

E. Indoor Design Criteria:

1. Offices: Cooling

   a. Occupied: 74°F
   b. Unoccupied: 80°F

2. Offices: Heating

   a. Occupied: 70°F
   b. Unoccupied: 60°F

3. Holdrooms: Cooling

   a. Occupied: 72°F
   b. Unoccupied: 80°F

4. Holdrooms: Heating

   a. Occupied: 72°F
   b. Unoccupied: 60°F

5. Electrical/Mechanical Rooms: Cooling

   a. Occupied: 78°F
   b. Unoccupied: 78°F

6. IDF/MDF Spaces: Cooling

   a. Occupied: 74°F
   b. Unoccupied: 74°F

7. Concession Spaces: Cooling

   a. Occupied: 72°F
   b. Unoccupied: 80°F

8. Concession Spaces: Heating

   a. Occupied: 72°F
   b. Unoccupied: 60°F

9. Corridors: Cooling

   a. Occupied: 72°F
   b. Unoccupied: 80°F

10. Corridors: Heating

    a. Occupied: 72°F
    b. Unoccupied: 60°F

11. TSA/Security Checkpoints: Cooling

    a. Occupied: 72°F
    b. Unoccupied: 80°F

12. TSA/Security Checkpoints: Heating

    a. Occupied: 72°F
    b. Unoccupied: 60°F

F. Ventilation Requirements and Building Air Balance:

1. Ventilation outside Air shall be in accordance with ASHRAE 62.1.
2. The balance between outside air and exhaust air will result in a positively pressurized building when in occupied periods.

G. Filtration:

1. RHU's:

   a. Pre-Filters: 4" 30% ASHRAE efficient filters (MERV 8)
   b. Final Filters: 12" Cartridge 90% ASHRAE efficient filters (MERV 13)

2. FCU's:

   a. Filters: 4" 30% ASHRAE efficient filters (MERV 8)

3. Filters shall be industry standard sizes.
4. Filter frames shall be galvanized sheet metal with spot welds or fully welded.

H. The new is designed as an approximate 42,000 s.f. single story Airport Concourse facility with mechanical mezzanines. Preliminary load calculations have been conducted to determine rough HVAC equipment sizing.

I. Packaged DX Rooftop Units (RTU) shall be provided on the roof and will condition the Office spaces, Hold Rooms, and TSA/Security Checkpoints. The RTUs shall have DX cooling coils and electric re-heat coils. The RTU's will utilize VAV terminal units for zone control will have electric heat within the VAV terminal units.

1. RTUs shall have the following configuration:

   a. Mixing box section
   b. Filter section with 4" pre-filters and 12" final-filters
   c. Access Section
   d. DX coil.
   e. Access Section
   f. Plenum supply fan array (Minimum 2 supply fans in array)
   g. Electric Heat Coil
   h. Discharge Plenum

2. Solid Double wall construction (MFG guaranteed non-condensing thermal performance), set on concrete pad, with internal spring isolated fans (minimum 2" deflection spring isolation, and neoprene pad below.)
3. Coil shall be 12 FPI max.
4. Cooling coils shall be sized for 52 degree LAT.
5. Condensate drains shall be stainless steel.
6. Coil casings shall be stainless steel.
7. Control Dampers will have airfoil blades with blade seals.
8. Motors shall be provided with AEGIS shaft grounding rings, factory installed, for all motors served from VFD's.

J. Building Ventilation air shall be induced directly into the RTU's intake hood. Outside air paths will be monitored by airflow monitoring stations (Ebtron Gold or approved equal) for airflow tracking and proper building pressure control.

K. Building general exhaust shall be provided by roof mounted centrifugal downblast exhaust fans located on the roof.

L. Building Heating will be provided by electric heaters at each RTU. For RTUs with VAV terminal units, electric reheat shall be provided at the terminals (VTUs), with SCR control, sized to meet building heating demands.

M. Temperature critical spaces which require continual cooling such as IT/Data rooms shall be provided with dedicated VAV terminal units and a Split-DX backup system for redundancy.

N. Supply and return air ductwork will be externally insulated galvanized steel when routed above ceilings, and would be double wall round if exposed. All ductwork to be insulated in concealed areas shall be fiber blanket type, all insulated ductwork exposed in mechanical spaces shall be rigid board insulation.

O. All ductwork shall be formed from galvanized steel and shall conform to the requirements of SMACNA's Duct Construction Standards, NFPA Standard 90A. All supply ductwork shall be externally wrapped with 2 inch fiberglass insulation with FSK vapor barrier. Return and exhaust ductwork shall be constructed per low pressure supply ductwork standards, except that they will not be insulated except as required by the International Energy Code. Fire dampers and combination fire/smoke dampers will be installed at all ductwork penetrations of rated fire and smoke walls/partitions and shafts as shown on the architectural floor plans. Seal all ductwork (supply, return and exhaust) in accordance with the International Energy Code. Do not use snap lock construction.

1. Low pressure ductwork will be designed from the terminal units (VTU) to the diffusers/grills, RA ductwork, and exhaust ductwork. Low pressure ductwork will be sized to deliver air at a friction pressure drop not to exceed 0.08"w.c. per 100' of duct. (i.e. Air Duct Calculator)
2. Medium pressure ductwork will be designed from the VAV AHU to the terminal units (VTU). Medium pressure ductwork will be sized to deliver air at a friction pressure drop not to exceed 0.2"w.c. per 100' of duct or no more than 2000 FPM (Max 1500 FPM in acoustic sensitive locations.). (i.e. Air Duct Calculator)

P. Exhaust ductwork shall be un-insulated galvanized steel.

Q. The complete air and water system will be tested, adjusted and balanced by an independent certified testing and balancing firm (NEBB or AABC) as required to ensure system performance in accordance with design criteria.

R. A direct digital control (DDC) building automation system (BAS) shall be provided. All HVAC mechanical devices will be interfaced with the BAS for control, monitoring and alarm. A centrally located operator's computer workstation will be provided for BAS reference and adjustment. Siemens is the owner preferred controls manufacturer.

1. All air-handling units and other major equipment shall use DDC with stand-alone panels for each unit.
2. Provide Optimized start/stop scheduling, occupied/unoccupied set-points, Night set-back, Schedule control, Static pressure reset schedules, SA reset schedules, OA flow monitoring/control, Relief Airflow monitoring/control, VFD's on all fans other than small CV general exhaust.
3. All cooling and heating coils shall have Discharge air temperature sensors for monitoring performance.
4. Damper actuators shall be DDC.

5. Control valves shall be pressure independent Characterized ball control valves with stainless steel stems and balls.
6. Control sequences shall comply with ASHRAE 90.1.

S. UL555s Combination Fire Smoke Dampers, UL555 Fire Dampers, and UL555s Smoke Dampers shall be provided in accordance with FBC/FMC.

T. Air distribution shall be supplied through diffusers located in acoustical ceiling tile or drywall ceiling, at ceiling level. Ceiling return grilles shall transfer the supplied air to the return air system. It is anticipated that the following grilles/diffusers will be incorporated in the design.

1. 24x24 Lay-In Architectural Plaque Diffuser
2. 12x12 Surface Mounted Plaque Diffuser
3. 1 to 3 slot diffusers ¾" slot – (High Ceiling Areas / Perimeters)
4. Perforated Return Grilles
5. Louvered Return Grilles (i.e. Sidewall)
6. Louvered Supply Grilles (i.e. Sidewall)
7. Supply Nozzles (High Volume Spaces such as Hold Rooms and TSA/Security Checkpoints)

U. Intake Louvers sized for 500 FPM at free area, and exhaust louvers shall be sized for 750 FPM at free area. Louvers will be specified to be AMCA 540/550.

V. Commissioning:

1. The building will be commissioned to meet the design intent of the drawings. Contractor shall provide all required labor and material to support commissioning process. Contractor shall provide labor to complete testing of systems under the direction of the commissioning authority.
2. Commissioning shall be provided to meet code minimum commissioning requirements.

1.4 QUALITY ASSURANCE

A. Code Compliance: Comply with all rules, laws, statutes, regulations, building codes, and the amendments of local, state and federal governments by the authorities having jurisdiction.

B. ADA: Comply with the requirements of the Americans with Disabilities Act (ADA).

C. HANDICAP ACCESS: Comply with Chapter 553, Part II, Florida Statutes, "ACCESSIBILITY BY HANDICAP PERSONS"; and the accessibility requirements manual from the Florida Board of Building Codes and Standards, Department of Community Affairs, latest Revisions.

D. NFPA: Comply with the National Fire Codes compiled by the National Fire Protection Association.

E. Florida Building Code: Conform in strict compliance to the current editions of Florida Building Code; Florida Mechanical Code; Florida Energy Efficiency Code, Florida Plumbing Code; Florida Fuel Gas Code; and the amendments to these codes which are enforced by the local authority having lawful jurisdiction.

1.5 DRAWINGS AND SPECIFICATIONS

A. Equipment Placement: The drawings are diagrammatic, intended to show general arrangement, capacity and location of various components, equipment and devices. Reasonable changes in locations ordered by the Engineer prior to the installation may be made at no additional cost.

B. Drawing Scale: Due to the small scale of the drawings, and to unforeseen job conditions, all required offsets, transitions and fittings may not be shown but shall be provided at no additional cost.

1.6 DEFINITIONS

A. Concealed: When standing inside a finished room, insulated or non-insulated piping or ductwork not visible after installation, such as inside a chase or above a ceiling.

B. Exposed: When standing inside a finished room, insulated piping or ductwork is visible after installation, such as inside an equipment room or an air handling unit room.

C. Protected: The surface of insulated or non-insulated piping or ductwork on the exterior of the building but protected from direct exposure to the weather by an overhang, eave, in an unconditioned parking garage or building crawl space.

D. Unprotected: The surface of insulated on non-insulated piping or ductwork on the exterior of the building and exposed to the weather.

1.7 SUBMITTALS

A. Shop Drawings: Shop drawings include piping system layouts, ductwork layouts, fabrication and installation drawings of supports and anchorage for mechanical materials and equipment, and coordination drawings. Shop drawings also include proposed equipment layouts, drawn to scale, indicating that proposed equipment will fit into allotted space, including service access, connections, etc.

1. Piping Systems: See Specification 232113 HYDRONIC PIPING. Submit shop drawings for piping systems drawn at a minimum scale of ¼ inch per foot to verify clearances and equipment locations. Show required maintenance and operational clearances. Include the following:

a. Architectural and structural backgrounds with room names and numbers, including but not limited to plans, sections, elevations and details.
b. Fabrication and erection dimensions.
c. Arrangements and sectional views.
d. Details, including complete information for making connections to equipment.
e. Descriptive names of equipment.
f. Modifications and options to standard equipment required by Contract Documents.
g. All in ground: Electrical Boxes, plumbing, mechanical, valve boxes or similar.

2. Ductwork: See Specification 233113 METAL DUCTS. Submit shop drawings for duct systems at a minimum scale of 1/4 inch per foot to verify clearances and equipment locations. Show required maintenance and operational clearances. Include the following:

a. Architectural and structural backgrounds with room names and numbers, etc., including but not limited to plans, sections, elevations, details, etc.
b. Fabrication and erection dimensions.
c. Arrangements and sectional views.
d. Details, including complete information for making connections to equipment.
e. Materials and finishes.
f. Descriptive names of equipment.
g. Modifications and options to standard equipment required by Contract Documents.

3. Coordination Drawings: Submit coordination drawings including detailed drawings showing locations and positions of all Architectural, structural, plumbing, fire protection, electrical and mechanical elements. Drawings shall be minimum ¼ inch per foot for each mechanical equipment room, mechanical riser, or chase. All other areas shall be a minimum 1/8 inch per foot. Including but not limited to the following:

a. Refer to 230010-1.7 below for additional coordination drawing requirements.
b. Architectural and structural backgrounds with room names and numbers, etc., including but not limited to plans, sections, elevations, details, etc.
c. Show all trades coordinated and signed off by all trades prior to submitting.
d. Show all required maintenance and operational clearances.
e. Show all required access doors, proposed door types, door finishes, and sizes for Architect review. (Walls, Floors Ceilings…)
f. All in ground: Electrical Boxes, plumbing, mechanical, valve boxes or similar.

4. All overhead equipment requiring access for maintenance and replacement shall have a clear vertical space from the equipment to the floor, excluding removable ceiling tiles. The clear vertical space shall also include the space required for equipment access from a ladder. This overhead equipment shall include but not be limited to air terminal units, exhaust fans and valves. Contractor shall coordinate with all trades to ensure this clearance is maintained; as this clearance area shall not be infringed upon by any equipment including conduit, wiring, piping or ceiling

grid support wires. (No equipment shall be over 16'AFF, and all equipment shall be accessible with no more than a standard 10' ladder.).

5. All exterior electrical, plumbing, mechanical or other similar equipment shall be shown on the coordination drawings and shop drawings, and shall be easily accessed without disturbing or traversing any landscaping.

B. Product Data: Product data includes the manufacturer's printed literature, and the complete model number for each piece of equipment.

C. Performance Data: Provide performance data, wiring and control diagrams.

D. Installation Instructions: Installation instructions include detailed information, from the manufacturer, indicating specific installation requirements, instructions, and recommendations. Generic installation instructions are not acceptable. Instructions shall be the same as those included with the product when it is shipped from the factory.

E. Written Operating Instructions: Operating instructions shall be the manufacturer's written operating instructions for the specified product. If the instructions cover more than one model or type of product they shall be clearly marked to identify the instructions that cover the product delivered to the project.

F. Maintenance Instructions: Maintenance instructions shall be the manufacturer's printed instructions and parts lists for the equipment furnished. If the instructions cover more than one model or type of equipment they shall be marked to identify the instructions for the furnished product.

G. Operations and Maintenance Manuals:

1. In addition to the comments noted above refer to below CxA requirements and refer to Commissioning Specifications and Commissioning Plan for additional requirements.
2. O&Ms shall be submitted (30) days after the approved equipment submittals.
3. O&M data shall be developed and compiled in accordance with ASHRAE Guideline 4.
4. One (1) bound copy and two (2) copies in PDF format are required. The PDF shall include recognizable text and bookmarks for ease of navigation.
5. The equipment submittals shall be provided by the CM in (1) complete and cohesive PDF package. If PDFs are combined, each submittal section shall be individually bookmarked to aid in navigation and review.
6. Any documentation that requires project completion shall be provided with a detailed placeholder indicating the information needed and the anticipated date or project milestone. All placeholders shall be filled and incorporated into the O&Ms prior to Substantial Completion.
7. A Schedule of Fuses, that lists all equipment which uses fuses, shall be included in the O&M manuals. This schedule shall indicate the quantity and size of fuses for each piece of equipment.

8. The following information shall be included in the O&M submittal for each system:

   a. Manufacturer's installation information
   b. Manufacturer's operational information
   c. Manufacturer's maintenance information
   d. Manufacturer or 3rd party start-up information
   e. Equipment name and full model number for each piece of equipment that is addressed by the O&M section
   f. All options or accessories that have been provided are identified and all items that have not been included are stricken
   g. All requirements to keep warranty in effect
   h. Any service contracts issued.

9. The O&Ms shall be reviewed and approved by the A/E team.

   a. When the A/E team's approval of the O&Ms is imminent, the CxA shall be notified proceed with a commissioning process related review of the documents. The CxA's comments shall be returned to the A/E team. The A/E team shall respond to these comments (where required response is needed by the A/E) and incorporate them into their comments to the contractor as needed to provide resolution.

H. Warranty Manuals:

1. In addition to the comments noted above refer to below CxA requirements and refer to Commissioning Specifications and Commissioning Plan for additional requirements.
2. Each manual shall have a "Table of Contents" page and each section shall be easily identified by a tabbed divider sheet.
3. Each manual shall have a title page that includes the name of the project; name of the manual; name, address and telephone number of the Contractor and Sub-contractor; and the date of expiration of the warranty.
4. All warranties are to be begin from the date of Substantial Completion.

5. The warranty manuals shall include a warranty matrix. Below is a list of information that shall be included in the warranty matrix. This information is intended to augment, but not replace any typical warranty requirements.

   a. This warranty matrix shall be a supplement to other specified warranty document requirements in the project specifications.
   b. The CM shall prepare and manage a warranty matrix (by division) that includes the warranty information for all of the equipment and systems in the project. The purpose of the warranty matrix is so the owner has a single reference document which provides basic information on warrantees.

   c. As a minimum, the warranty matrix shall include the following information:

1) Product Manufacturer
2) Manufacturer Address
3) Manufacturer's Project Order Number or Warranty Number
4) Serial numbers for all major equipment
5) Warranty Department Contact Information (Name, Phone Number, Address)
6) Start Date of Warranty
7) Duration of Warranty
8) Coverage
9) Limitation/Exclusions
10) Any specific maintenance or documentation requirements to maintain warranty
11) Owner of Warranty
12) When the A/E team's approval of the Warranty Manual is imminent, the CxA shall be notified proceed with a commissioning process related review of the documents. The CxA's comments shall be returned to the Owner and A/E team. The A/E team shall respond to these comments (where required response is needed by the A/E) and incorporate them into their comments to the contractor as needed to provide resolution.

I. As-Built Documents:

1. In addition to project specification requirements indicated in other specification sections and/or drawing notes, the following requirements shall be incorporated by the contractor.

2. An accurate set of construction as-builts is critical to the sustainability of the building. The following items shall outline the desired process associated with obtaining accurate as-builts:

a. As-built documents shall be on the construction site at all times. The documents shall be updated to the current stage of construction, at least weekly.
b. A field-copy of the completed as-built drawings shall be available for verification during commissioning verification.
c. Following commissioning verification, any modifications shall be completed by the contractor, scanned and provided to the Owner and A/E team in PDF format (and electronic current AutoCAD or Revit format.). The PDF files shall be combined and bookmarked in the same manner as the original construction documents. All PDF bookmarks shall include the drawing number and description from the original titleblock. (Contractor shall provide their own title block for as-builts.)

d. The A/E team shall be responsible for using the field-copy of the as-builts, field notes obtained during the construction administration process, and electronic as-builts provided by the contractor, to update the construction documents into an as-built set of documents.

1) The as-built drawings and specifications shall be provided to the Owner in an electronic format. This shall include all files and X-refs in DWG or DXF file format, as well as assembled and bookmarked PDFs. There shall be (1) copies provided by way of individual and labeled DVDs.

e. The contractor shall be responsible for identifying all in-ground boxes and providing as-built GPS coordinates for these locations on the respective as-built documents.

J. Training Plan. Refer to Requirements below

K. Systems Manual. Refer to Requirements below.

L. Spare Parts:

1. Spare materials shall be provided as a part of this project. In addition to any requirements in the drawings and/or specifications, the following minimum list of items shall be provided:

a. 5 of each of temperature sensor
b. 1 of each type of humidity sensor
c. 1 of each type of CO2 or VOC sensor
d. 1 of each type of dry differential pressure sensor and/or switch
e. 1 of each type of wet differential pressure sensor and/or switch
f. 1 of each type of air flow measuring station
g. 1 of each type of CT
h. 1 of each type of actuator
i. 1 of each type of thermometer
j. 1 of each type of pressure gauge
k. 1 of each type of BAS controller
l. 1 of ANY critical of long lead items
m. 2 of each type of BAS controller
n. 1 extra of any BAS interface

1.8 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for HVAC installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for HVAC items requiring access that are concealed behind finished surfaces.

D. The Contractor shall coordinate efforts of all trades and shall furnish (in writing, with copies to the Architect and Owner) any information necessary to permit the Work of all trades to be installed satisfactorily and with the least possible interference or delay.

E. The Contractor and all Subcontractors shall prepare a complete set of construction coordination drawings ("Coordination Drawings") indicating the equipment actually purchased and the exact routing and elevations for all lines such as piping, busway, conduit, ductwork , etc., including conduit embedded in concrete and openings, sleeves, etc., required in the structure, walls, partitions, etc. The Coordination Drawings shall be submitted complete for review to the Architect, Engineer and Owner. The Coordination Drawing preparation and completion shall comply with the requirements of the Schedule. Prior to commencing the Work, the Subcontractor shall obtain from the Architect or Engineer a set of AutoCAD compatible format Architectural and Engineering Drawings on compact disks, to be used to produce the Coordination Drawings. The Subcontractor shall give to the Architect and Engineer a written release acceptable to the Architect and Engineer signed by a corporate officer of the Subcontractor, prior to receipt of the compact disks. The sheet metal Drawings, prepared on electronic media (CADD) at a scale not less than 1/4" = 1'-0", shall serve as the base Drawings to which all other Subcontractors will overlay and add their Work. The Division 23 Mechanical Subcontractor shall be designated as the lead contractor in the development of the composite layering process and shall be responsible for electronically restacking the various trade layers into the final composite (CADD) Drawings. Each trade shall draw their Work on separate layers represented by individual colors. Each Coordination Drawing shall be completed and signed off by the other Subcontractors and the Contractor prior to the installation of the Work in the area covered by the specific Coordination Drawing. The Subcontractors Work shall be installed in accordance with the Shop Drawings and the Coordination Drawings and shall include the required maintenance access space and the code clearance space. If the Contractor allows one trade to install their Work before coordinating with the Work of other trades, the Contractor shall make necessary changes to correct the condition without extra cost to the Owner. The Coordination Drawings indicating piping, conduit, busway and equipment support points and loads exceeding 250 lb. imposed on the building structure shall be submitted to the Architect for review and approval. The elevation, location, support points, static, dynamic and expansion forces and loads imposed on the structure at support and anchor points and the size of all lines shall be indicated. All beam penetrations, slab penetrations and sleeves shall be indicated, sized and coordinated with all other Work. All required code clearance space and required maintenance access space shall be indicated and coordinated with all other work. All Work routed underground or embedded in concrete shall be indicated by dimension to column and building lines and shall be coordinated. This requirement for Coordination Drawings shall not be construed as authorization for the Contractor or Subcontractor to make any unauthorized changes to the Drawings. All space allocations shown on the Drawings shall be maintained, such as ceiling height. Prior to final acceptance of the Work, the Contractor shall give the Drawing files in the latest version of AutoCAD or compatible format on CD-RW Recordable Rewrite Compact Discs, containing the Contractor's coordination documentation, to the Owner.

1.9 INSTRUCTION TO THE OWNER

A. General: Instructions to the Owner shall be accomplished by representatives of the manufacturers involved. Allow time for complete coverage of all operating procedures. Provide field training in the design, operation and maintenance of the equipment and troubleshooting procedures. Explain the identification system, operational diagrams, emergency and alarm provisions, sequencing requirements, seasonal provisions, security,

safety, efficiency and similar provisions of the systems. On the date of substantial completion, turn over the prime responsibility for operation of the mechanical equipment and systems to the Owner's operating personnel.

B. Training Period: Training period shall encompass a minimum of 12 hours of hands-on instructions with a maximum period of 4 hours per day.

C. Scheduling: Submit any remaining required items for checking at least one week before final inspection of the work. When submittal items are found acceptable, notify the Owner, in writing, that an "Instruction Conference" may proceed. Conference will be scheduled by the Owner. After the conference, copies of a memo certifying that the "Instruction Conference" and "Completed Demonstration" have been made will be signed by the Owner and the instructors, and one copy will be inserted in each submittal binder.

1. Training shall not be conducted with the owner until after the commissioning activities are complete.

D. Training Plan Content Requirements:

1. In addition to the comments noted above refer to below CxA requirements and refer to Commissioning Specifications and Commissioning Plan for additional requirements.
2. A Training Plan shall be developed by the contractor and provided to the Owner and A/E team for review and approval prior to any training instruction being conducted. When the A/E team's approval of the Training Plan is imminent, the CxA shall be notified proceed with a commissioning process related review of the documents. The CxA's comments shall be returned to the Owner and A/E team. The A/E team shall respond to these comments (where required response is needed by the A/E) and incorporate them into their comments to the contractor as needed to provide resolution.

3. The information below includes the typical requirements for the training plan for each building system:

a. Clearly identify the systems, subsystems, equipment, and assemblies for which training will be required.

1) Outline of instructional topics related to the systems, subsystems, equipment, and assemblies. These topics shall address the design, construction, operation, and maintenance of specific systems, assemblies, and equipment
2) Learning objectives and training delivery methods for each instructional topic

b. Clearly identify the number and type of training sessions.

1) The training program should be organized into a series of instructional modules, each covering a portion of the facility's systems, equipment, and assemblies.
2) The planned location of the training sessions (classroom, on site, and off site) and the minimum duration of each training session, in hours, to be completed as required in the OPR, Cx Plan, or construction documents

c. Instructor's qualifications

d. General purpose of system (design intent).

1) Overview and description of the purposes of the system.

e. Use of project documents.

1) Training materials requirements to be employed during the instructional process
2) Training report, records, and recording requirements
3) Upkeep of the Systems Manual and associated maintenance documentation and logs.

f. Review of control drawings and schematics.

1) Review of control drawings and schematics (have copies for attendees)
2) Building automation system (BAS) controls: programming, troubleshooting, alarms, manual operation, interface with integral controls
3) Integral controls (packaged): programming, troubleshooting, alarms, manual operation

g. Startup, normal operation, shutdown, unoccupied operation, seasonal changeover, manual operation, control setup and programming troubleshooting, and alarms.

1) System response to different operating conditions.
2) Startup, loading, normal operation, unloading, shutdown, unoccupied operation, seasonal changeover, etc., as applicable
3) Operation instructions and procedures: the procedures required for normal operation of the facility, including step-by-step instructions for day-to-day operation.
4) Adjustment instructions: information for maintaining operational parameters.
5) System troubleshooting: description of diagnostic step-by-step procedures for determining the source of problems on the system level; review technical service manual in detail.

6) Component troubleshooting: description of diagnostic procedures for determining the source of problems on the component level.
7) Common troubleshooting issues and methods, control system warnings and error messages, including using the control system for diagnostics.
8) Troubleshooting procedures: instructions for diagnosing operating problems and procedures for testing and inspecting.
9) Emergency instructions and procedures: those required for operating the facility during various emergencies, including step-by-step instructions for each type of emergency.

h. Interactions with other systems, including operation during power outage and fire.
i. Adjustments and optimizing methods for energy conservation.
j. Relevant health and safety issues and concerns and special safety features.
k. Demonstrate for the Owner that all floors with floor drains are pitched to the floor drain. Demonstrate all floor drains during training.
l. As a part of training, the contractor shall arrange for the Owner to access each piece of equipment located above finished floor, to confirm that clear vertical spaces have been provided.
m. All equipment located above the ceiling or behind an access door shall have the name of the equipment provided on the ceiling grid or access door that is clearly visible from ground level. This includes, but is not limited to air terminal units, valves, fire dampers and exhaust fans. During training the contractor shall identify each of these labels during a walk-thru style review with the Owner.

n. Component maintenance:

1) Instruction of required procedures for weekly, monthly, and annual preventive checks and timely repairs to preserve system integrity (sources, spare parts inventory, special tools, etc.).
2) Any special issues to maintain warranty.
3) Repair procedures: instructions for diagnosing problems and for disassembly, component removal, replacement, and reassembly.

o. The anticipated capabilities and knowledge of the occupants and operations and maintenance personnel.

1) Measurable learning objectives and teaching outlines should be developed to clearly describe the specific skills and knowledge that the participant is expected to master.

p. Occupant interaction issues.

1) Special requirements of tenants for this equipment's function.

q. Question and Answer Period.

4. Supplemental requirements for the Training have been provided below. These supplemental requirements shall be integrated with the training plan requirements as applicable.

    a. A digital video recording of each training session shall be made and three (3) copies shall be provided to the Owner prior to Substantial Completion.
    b. A minimum of four (4) hours of instruction shall be provided for each system or major piece of equipment.
    c. Classroom training shall be provided for the BAS system in the following quantities; three (3) day basic operator training for four (4) students; four (4) day intermediate training for four (4) students; four (4) day advance training for four (4) students.
    d. One week of factory training for two (2) operators at the general level and one week for two (2) operators at the advanced level shall be provided for the BAS system.
    e. Owner personnel shall receive training in the prevention, recognition and resolution of indoor environmental quality concerns.
    f. The Owner requires at least two (2) weeks reviewing the contractor provided training schedule and responding with availability for training sessions.
    g. The Owner desires more hands on training. Contractor shall indicate hands on sessions vs classroom sessions in the training plan for review by the Owner.
    h. Multiple sessions and shifts shall be coordinated with the Owner.
    i. Multi-lingual training shall be coordinated with the Owner for specific personnel and systems.
    j. All training shall include Standard Operating Procedures and the Procedures indicated above

E. Systems Manual:

1. A Systems Manual shall be developed for the commissioned systems. This document shall be developed to comply with the requirements and recommendations of ASHRAE 202-2013, ASHRAE GL-0-2005, ASHRAE GL-4 and LEED 2009. Refer to the table indicated in the Commissioning specifications, for the general format of the document and the responsible parties.
2. The initial system manual shall be submitted (30) days after the approved equipment.
3. The Final System manual shall be submitted prior to commissioning verification and substantial completion, whichever is first.
4. At the time of the initial and final system manual submission, the CxA shall provide the section covers and table of contents documents as described in the Commissioning plan. The documents will then be sent to the Design (A/E) Team for review and comment. Following approval; the A/E team, Owner, Contractor shall incorporate their portions of the systems manual and the forward it the CxA for verification. The CxA will return any comments to the A/E team and incorporate their portions of the systems manual.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Specified Products: Manufacturer's names and product model numbers indicated on the drawings and in these specifications establish the type, style, quality, performance, and sound rating of the desired product. Listing of other manufacturers indicates that their equivalent products would be acceptable if they meet the specification requirements, the specific use and installation shown on the drawings, including space and clearance requirements, and the energy consumption and efficiency of the specified product.

B. Space Requirements: All manufactured products furnished on this project must have the required space and service areas indicated in the manufacturer's printed literature or shown on their approved shop drawings. When the manufacturer does not indicate the space required for servicing the equipment, the space shown on the drawings or as required by the Engineer must be provided.

2.2 MATERIAL AND EQUIPMENT

A. General: Material and equipment used shall be produced by manufacturers regularly engaged in the production of similar items, and with a history of satisfactory use as judged by the Engineer.

B. Specified Equipment: Equipment shall be the capacity and types indicated. Equipment and material furnished shall be the manufacturer's standard item of production unless specified or required to be modified to suit job conditions. Sizes, material, finish, dimensions and the capacities for the specified application shall be published in catalogs for national distribution. Ratings and capacities shall be certified by a recognized rating bureau. Products shall be complete with accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.

C. A~~C~~ompatibility: Material and equipment of one and the same kind, type or classification and used for identical or similar purposes shall be made by the same manufacturer. Where more than one choice is available, select the options which are compatible with other products already selected. Compatibility is a basic general requirement of product selection.

D. Zero where possible, and Low VOC construction materials shall be utilized for this project to comply with owners OPR and BOD. Product submittals shall clearly indicate compliance with this project requirement.

2.3 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 23 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.4 JOINING MATERIALS

A. Refer to individual Division 23 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

E. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

F. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

2.5 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solderjoint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

E. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

F. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F .

2.6 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

1. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
2. Pressure Plates: Stainless steel. Include two for each sealing element.
3. Connecting Bolts and Nuts: Stainless steel of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.7 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.
1. Underdeck Clamp: Clamping ring with set screws.

E. Molded PVC: Permanent, with nailing flange for attaching to wooden forms.

F. PVC Pipe: ASTM D 1785, Schedule 40.

2.8 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Type: With set screw.

1. Finish: Polished chrome-plated.

D. One-Piece, Stamped-Steel Type: With set screw or spring clips and chrome-plated finish.

E. Split-Plate, Stamped-Steel Type: With exposed-rivet hinge, set screw or spring clips, and chrome-plated finish.

F. One-Piece, Floor-Plate Type: Cast-iron floor plate.

2.9 VIBRATION AND SOUND CONTROL

A. Sound is of the utmost critical nature in this facility. The contractor shall comply with Specification Section 230548 Vibration Controls for HVAC Piping & Equipment. Contractor shall provide isolation and support in strict accordance to the specification.

1. Contractor shall provide all necessary vibration isolation and support to install a noise and vibration-free systems.

B. Contractor shall provide hanging and support in compliance with Specification Section 23 0529 Hangers and Supports for HVAC Piping and Equipment.

2.10 EXPOSED DUCTWORK AND EQUIPMENT

A. All exposed ductwork and equipment shall be installed with attention to aesthetic details. System shall be installed in a logical method.

1. Equipment shall be systematically laid out. Exposed piping, ductwork, etc. that is visually undesirable to the architect/engineer shall be reinstalled at the contractor's sole expense.
2. Exposed Ductwork in the space that is visually undesirable to the architect/engineer shall be reinstalled at the contractor's sole expense.

2.11 EQUIPMENT GREASE FITTINGS

A. Provide grease fittings for all equipment requiring grease for maintenance. Grease fittings shall fit a standard grease gun.

B. Access to grease points on all equipment shall be provided without the use of remote grease fittings. If this cannot be provided, the remote grease lines shall be copper, with grease fittings located in an accessible location.

PART 3 - EXECUTION

3.1 WORKMANSHIP

A. General: Personnel who install materials and equipment shall be qualified by training and experience to perform their assigned tasks.

B. Performance: Material and equipment installations not in compliance with the Contract Documents, or installed with substandard workmanship in the opinion of the Engineer, shall be removed and reinstalled.

3.2 CLEANING AND PROTECTION

A. General: Refer to Division 01.

B. Housekeeping: Keep interiors of duct and pipe systems clean and free from dirt, rubbish and foreign matter. Close open ends of piping and ductwork at all times throughout the installation. Install 30% efficient filter media over each return air grille and open return duct opening; change media regularly during construction when dirty to keep duct interiors clean. Prevent dust, debris and foreign material from entering the piping and ductwork.

C. Equipment Protection: Protect fan motors, switches, equipment, fixtures, and other items from dirt, rubbish and foreign matter. Do not operate air handling equipment if the building is not clean or if dust can enter the coils or the fan housings.

D. Equipment Cleaning: Thoroughly clean equipment and entire piping systems internally upon completion of installation and immediately prior to Submittal Completion. Open dirt pockets and strainers, blow down each piping system and clean strainer screens of accumulated debris. Remove accumulated dirt, scale, oil and foreign substances. Thoroughly wipe clean internal surfaces of ductwork and air handling units prior substantial completion.

E. Fixture Cleanup: Remove temporary labels, stickers, etc., from fixtures and equipment. Do not remove permanent name plates, equipment model numbers, ratings, etc.

F. Filter Replacement: Provide filters, with the same efficiency rating as required for the final installation, for the protection of the air moving equipment and ductwork continuously throughout the construction phase. Provide a new set of clean filters for the test and balance of the air side equipment.

G. Protection of Finished Installation: Where installation is required in areas previously finished by other trades, protect the area from marring, soiling or other damage.

3.3 CORRECTION OF WORK

A. General: At no additional cost to the Owner, rectify discrepancies between the actual installation and Contract Documents when in the opinion of the Testing and Balancing Agency (T&B Agency) or the Engineer the discrepancies will affect system balance and performance.

B. Drive Changes: Include the cost of all pulley, belt, and drive changes, as well as balancing dampers, valves and fittings, and access panels to achieve proper system balance recommended by the T&B Agency.

3.4 COORDINATION AND ASSISTANCE

A. General: Provide all labor, equipment, tools and material required to operate the equipment and systems necessary for the testing and balancing of the systems and for the adjustment, calibration and repair of all electric or pneumatic automated control devices and components. These services shall be available on each working day during the period of final testing and balancing.

B. Drawings and Specifications: Provide to the T&B Agency a complete set of project record drawings and specifications and an approved copy of all HVAC shop drawings and equipment submittals. The T&B Agency shall be informed of all changes made to the system during construction, including applicable change orders.

C. Coordination: Coordinate the work of all trades and equipment suppliers to complete the modifications recommended by the T&B Agency and accepted by the Engineer. Cut or drill holes for the insertion of air measuring devices as directed for test purposes; repair to as-new condition, inserting plastic caps or covers to prevent air leakage. Repair or replace insulation and re-establish the integrity of the vapor retardant.

3.5 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
b. Insulated Piping: One-piece, stamped-steel type with spring clips.
c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, castbrass type with polished chrome-plated finish.
d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
e. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece or split-casting, cast-brass type with polished chrome-plated finish.
f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type or split-plate, stamped-steel type with concealed hinge and set screw.
g. Bare Piping in Unfinished Service Spaces: One-piece, cast-brass type with polished chrome-plated finish.
h. Bare Piping in Unfinished Service Spaces: One-piece, stamped-steel type with concealed or exposed-rivet hinge and set screw or spring clips.
i. Bare Piping in Equipment Rooms: One-piece, cast-brass type.
j. Bare Piping in Equipment Rooms: One-piece, stamped-steel type with set screw or spring clips.
k. Bare Piping at Floor Penetrations in Equipment Rooms: One-piece, floor-plate type.

3.6 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using leadfree solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

3.7 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.8 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install HVAC equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.9 PAINTING

A. Painting of HVAC systems, equipment, and components is specified in Division 9 Sections "Interior Painting" and "Exterior Painting."

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.10 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions and according to seismic codes at Project.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.

2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use minimum 3000-psi (or higher psi rating if required by the equipment manufacture or structural drawings), 28-day compressive-strength concrete and reinforcement as specified in Division 3 Section "Cast-in-Place Concrete.".

3.11 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 5 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor HVAC materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.12 GROUTING

A. Mix and install grout for HVAC equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

3.13 ACCESS DOORS AND FRAMES

A. Provide access doors and frames of the appropriate size and locations to allow access to mechanical equipment, valves, dampers, etc. All locations are to be field verified with the Architect prior to installation.

3.14 CEILING GRID / ACCESS DOOR LABELING AND EQUIPMENT LABELS:

A. All equipment located above the ceiling or behind an access door shall have the name of the equipment provided on the ceiling grid or access door that is clearly visible from ground level. This includes, but is not limited to air terminal units, valves, fire dampers and exhaust fans. During training the contractor shall identify each of these labels during a walk-thru style review with the Owner.

B. Equipment shall be clearly labeled (including but not limited to starters, disconnects, VFDs, Equipment…) and shall be consistent with the names used on the design drawings.

C. Refer to individual specification sections for additional labeling requirements.

D. Refer to Specification Section 230553 “Identification for HVAC Piping and Equipment” for additional requirements.

3.15 IN GROUND BOXES:

A. All in-ground electrical boxes, valve boxes or other similar equipment smaller than 24”x24” shall have a concrete pad poured around the perimeter to extend the edges of the location to at least 24”x24”.

3.16 INSTALLATION OF HVAC EQUIPMENT SUPPLIED BY OTHERS DIVISIONS

A. A. Division 23 Contractors shall be responsible provide all necessary labor, materials, and coordination required for successful installation of equipment provide by other divisions but vital for successful operation of HVAC equipment. Equipment and materials vital for successful operation of HVAC equipment include but are not limited to the follow:

1. Control Dampers
2. Control Valves

3. Kitchen Equipment:

   a. Cooler/Freezer Refrigeration Equipment
   b. Cooler/Freezer Refrigerant Piping
   c. Cooler/Freezer Refrigeration Curbing/Support/Wind Restraints

4. Thermowells
5. Pipe Taps
6. Water Sensors and Switches

3.17 PREPARATIONS FOR PERFORMANCE VERIFICATION

A. See Specification Section 230593 TESTING, ADJUSTING, AND BALANCING

B. Verification: Prior to commencement of balancing by the T&B Agency, verify the following in writing:

1. Air filters have been replaced and are clean.
2. Linkages between dampers and their actuators are secure, non-overloading and non-binding.
3. Ductwork specialties are in their normal operating positions.
4. Fans are operating at the correct rotation and specified RPM.
5. Ductwork has been pressure tested and accepted.
6. Strainers have been removed, cleaned and replaced, and that temporary construction strainers have been removed.
7. Compression or expansion tanks have been inspected, are not air-bound or water-logged and are pre-charged, and that the piping systems have been completely vented and filled with water.
8. Air vents at coils and high points of the piping systems have been inspected and installed and operating freely.
9. Automatic valves, hand valves, and balancing valves have been placed in a fixed open position for full flow through all devices.
10. Linkages between valves and their actuators are secure, non-overloading and non-binding.
11. Pressures for hydronic reducing valves have been set.
12. Operating temperatures have been set for chillers and regulating valves.
13. Pumps are operating at the correct rotation and specified horsepower.
14. Piping has been pressure tested and accepted and piping systems have been cleaned, flushed, sterilized and refilled with chemicals and prescribed treated water and vented.
15. Operating safety features (such as thermal overloads, firestats, freezestats, smoke detectors and relief valves), are installed and fully functional.
16. Equipment has been lubricated and can be operated without damage.
17. Systems are operational and complete.
18. No latent residual work remains to be completed.

3.18 PREFUNCTIONAL AND FUNCTIONAL PERFORANCE TESTING

A. Division 23 Contractors shall be responsible to carry out the commissioning requirements specified in the commissioning sections, and all other sections where related to commissioning. Provide all necessary labor, materials, and coordination required for successful completion of the commissioning requirements. Refer to all other individual project specification sections, Commissioning Specifications and Commissioning Plan for additional testing requirements.

B. System verification: HVAC Controls:

1. In addition to any other specified System Verification Requirements, the following minimum system verification shall be performed in addition to other project specifications. (Note: If there is a duplicate of system verification, it is not the intent to specify System Verification twice, but to establish the minimum requirements if not specified otherwise.)

2. Verify all sequences of operation, schedules, alarms and notifications

a. Test method:

1) Sequences, alarms and notifications will be demonstrated by the controls contractor using the functional performance test provided by the CxA.

b. Requirements to facilitate testing:

1) All sequences of operation, schedules, alarms and notifications shall be included on the contractors shop drawings in accordance with the construction documents, and numbered to allow ease of reference.
2) Each sequence, alarm or notification shall include a defined start, stop and response time value.

3. Verify setpoints and time delays:

1) Test method:

a) Setpoints and time delays will be demonstrated by the controls contractor using the functional performance test or construction checklists provided by the CxA

2) Requirements to facilitate testing:

3) All setpoints and time delays shall be included on the contractors shop drawings in accordance with the construction documents, along with the following information:

a) Values that shall be visible on the user graphics.
b) Values adjustable from the user graphics
c) Allowable range for user manipulation from the Values being trended
d) User adjustments being monitored
e) Adjustable range by users in space

4. Verify component calibration:

a. Component Calibration data required below, shall be clearly indicated in the contractors shop drawings, in accordance with contract drawings and specifications, to facilitate Component Calibration.

b. Humidity sensors and temperature sensors (air or water):

1) Test Method:

a) Calibration will be demonstrated by the TAB and controls contractors using a calibrated test instrument and comparing the control system value to the test measurement obtained within 12" of the sensors location.

2) Requirements to facilitate testing: The following values need to be defined in the contractors shop drawings per the contract documents for each sensor type:

a) Intended installation location
b) Device accuracy defined as a set value, percentage of operating range or percentage of measured value
c) Field calibration accuracy defined as a set value, percentage of operating range or percentage of measured value
d) Allowable control system or transducer offset
e) Wet temperature sensors require a pressure/temperature port that will provide an accurate and consistent reading. Provide a P/T test port by each wet sensor.

f) Air sensors require a ductwork location that will provide an accurate and consistent reading, therefore shall be located to provide the specified accuracy in accordance with the manufactures installation guidelines for the actual installation conditions.

c. Carbon Dioxide (CO2) or Volatile Organic Compound (VOC):

1) Test Method:

a) Calibration will be demonstrated by the TAB and controls contractors using an HVAC sequence of operation and test for relative calibration.
b) With building empty, allow O/A to enter the building until the reading for the O/A is within 50ppm of the indoor air, then close the O/A damper and continue to circulate indoor air for approximately 1-hr to confirm all sensors measure within 50ppm of each other.

2) Requirements to facilitate testing: The following values need to be defined in the contractors shop drawings per the contract documents for each sensor type:

a) Intended installation location
b) Device accuracy defined as a set value, percentage of operating range or percentage of measured value
c) Field calibration accuracy defined as a set value, percentage of operating range or percentage of measured value

d) Allowable control system or transducer offset

d. Airflow measuring stations:

1) Test Method:

a) Calibration will be demonstrated by TAB and controls contractor at the top and bottom of the typical operating range by performing a duct traverse up or downstream of device and comparing it to the control system value.
b) Where provided on design drawings, verification of an air filter between the unfiltered outside air and the airflow measuring station will be visually verified with the mechanical contractor.

2) Requirements to facilitate testing: The following values need to be defined on the contractors shop drawings in accordance with the contract documents for each sensor:

a) Intended installation location on ductwork drawing showing manufacturer recommended upstream and downstream straight duct requirements.
b) Intended installation location of the outside air filter.
c) Device accuracy defined as a set value, percentage of operating range or percentage of measured value.
d) Field calibration accuracy defined as a set value, percentage of operating range or percentage of measured value.
e) Allowable control system or transducer offset.

e. Dampers:

1) Test Method:

a) Calibration will be demonstrated by the TAB and controls contractor by conducting a visual verification of the device and comparing it to the control system value.

2) Requirements to facilitate testing:

a) Access doors and/or an accessible location within a user serviceable distance from the equipment shall be installed. Doors shall be sized to provide proper service access and accommodate testing/verification.

f. Hydronic valves:

1) Test Method:

a) Calibration will be demonstrated by the TAB and controls contractor by conducting a visual verification of the valve stem position and comparing it to the control system value.
b) The closed position shall be demonstrated by the TAB contractor using a differential pressure or temperature based leak-by test.

2) Requirements to facilitate testing:

a) Pressure/temperature test ports shall be installed immediately before and after the location of the leak-by test.

g. Current (Amp) Transducer or Switch:

1) Test Method:

a) Calibration will be demonstrated by the TAB and controls contractor using a calibrated test instrument and comparing the control system value to the test measurement.

2) Requirements to facilitate testing: The following values need to be defined for each sensor type:

a) Intended installation location
b) Device accuracy defined as a set value, percentage of operating range or percentage of measured value
c) Field calibration accuracy defined as a set value, percentage of operating range or percentage of measured value
d) Allowable control system or transducer offset

h. Hydronic static pressure or differential pressure sensor:

1) Test Method:

a) Calibration will be demonstrated by the TAB and controls contractor at the top and bottom of the typical operating range using a calibrated test instrument and comparing it to the control system value.

2) Requirements to facilitate testing: The following values need to be defined for each sensor type:

a) Intended installation location
b) Device accuracy defined as a set value, percentage of operating range or percentage of measured value.
c) Field calibration accuracy defined as a set value, percentage of operating range or percentage of measured value
d) Allowable control system or transducer offset.

e) Wet pressure sensors require a pressure/temperature port that will provide an accurate and consistent reading. Provide a P/T test port tee'd into each wet sensor input to accommodate calibration and testing.

i. Airflow Switch:

1) Test Method:

a) Calibration will be demonstrated by the TAB and controls contractor conducting a visual verification of the device and comparing it to the control system value.

2) Requirements to facilitate testing: The following values need to be defined for each sensor type:

a) Intended installation location
b) Device accuracy defined as a set value, percentage of operating range or percentage of measured value.
c) Field calibration accuracy defined as a set value, percentage of operating range or percentage of measured value.
d) Allowable control system or transducer offset.

j. Hydronic flow meter:

1) Test Method:

a) Calibration will be demonstrated by the TAB and controls contractor by isolating flow to a single pump or coil, determining the associated flow based on pressure drop and comparing it to the control system value

2) Requirements to facilitate testing: The following values need to be defined for each sensor type:
a) Intended installation location on CHW/HHW piping in accordance with manufacturer recommended upstream and downstream straight piping requirements.
b) Device accuracy defined as a set value, percentage of operating range or percentage of measured value.
c) Field calibration accuracy defined as a set value, percentage of operating range or percentage of measured value.
d) Allowable control system or transducer offset.

5. System verification: Each AHU, FCU, RTU or similar air handling device:

a. Control system components, including but not limited to sequences of operation, setpoints, time delays, dampers and valves shall be verified in accordance with the HVAC Control System information above.

b. Verify minimum / maximum supply, outside air and exhaust air volume.

1) Test method:

a) TAB contractor shall perform a duct traverse and compare it to the design values.

2) Requirements to facilitate testing:

a) Identify the intended test location on ductwork shop drawings and any requirement for straight ductwork.

c. Verify total and external static pressure on equipment

1) Test method:

a) TAB contractor shall perform static pressure profile across all associated dampers, filters, coils, heating elements and similar components at the maximum volume and compare it to the design value.

2) Requirements to facilitate testing:

a) Adequate access to drill or use pre-installed test ports at each pressure drop location along the equipment. (Contractor shall seal and plug all test ports after testing is complete with a removable plug to accommodate re-testing in the future.).

d. Verify hydronic volumes:

1) Test method:

a) TAB contractor shall demonstrate by measuring wet differential pressure across coil and comparing it to the manufacturer's coil data.
b) Verification shall be conducted (and documented) with system at the minimum differential pressure required to satisfy the building's most hydraulically remote device.

2) Requirements to facilitate testing:

a) Pressure and temperature test ports of adequate length will be needed immediately before and after CHW coil connection. (Install P/T Test ports to accommodate verification.)

e. Verify static and differential pressure at balancing device.

1) Test method:

a) Static and differential pressure will be verified with TAB contractor at the pressure and temperature ports nearest the balancing device.

2) Requirements to facilitate testing:

a) Pressure and temperature test ports needed to verify coil GPM should facilitate this test as well.

f. Verify heat transfer capacity of hydronic heating or cooling coil.

1) Test method:

a) While inducing the coil's maximum capacity by manipulating air volumes and temperatures, the TAB contractor will measure the water temperature and pressure drop to calculate the coil capacity.

2) Requirements to facilitate testing:

a) Pressure and temperature test ports needed to verify coil GPM should facilitate this test as well.

g. Verify heat transfer capacity of electric or DX heating or cooling coil:

1) Test method:

a) While inducing the coil's maximum capacity by manipulating air volumes and temperatures, temperature before and after the coil will be verified with the TAB contractor and used in conjunction with a known or measured air volume.
b) For electric heating coils, capacity may be determined by measuring voltage and amperage in lieu of air temperatures.

2) Requirements to facilitate testing:

a) Ductwork test location used for verifying air volumes should also facilitate this test

h. Verify coil EAT (DB & WB), LAT (DB & WB), EWT and LWT.

1) Test Method:

a) These values will be verified with the TAB contractor using a calibrated test instrument upstream and downstream of the coil.

2) Requirements to facilitate testing:

a) Sufficient access to ductwork and piping around unit. Testing for the unit's hydronic volumes should facilitate test ports for these measurements as well.

i. Verify motor(s) HP, amps and volts:

1) Test Method:

a) While at maximum design conditions, these values will be verified with the TAB contractor and their previously used calibrated test instruments.
b) Requirements to facilitate testing: No specific requirements.

j. Verify motor and Fan RPM

1) Test Method:

a) While at maximum design conditions, these values will be verified the TAB contractors calibrated tachometer.

2) Requirements to facilitate testing: No specific requirements.

k. Verify VFD operation

1) Test Method:

a) All Programmed settings will be accessed locally at the equipment verified with the TAB and mechanical contractor.
b) Direction of equipment rotation will be verified with the mechanical contractor using the VFD inverter and the mechanical bypass.

2) Requirements to facilitate testing:

a) Programmed settings for the following values need to be defined by the VFD start-up technician and controls contractor for a stable operating system:
b) Acceleration & Deceleration time
c) Minimum & Maximum operation frequency

d) Safeties that must remain in place when in bypass

6. System verification: Each Terminal Unit:

a. Verify control system components including but not limited to sequences of operation, setpoints, time delays, dampers and valves in accordance with the HVAC Control System information above.

b. Verify minimum and maximum air volumes for heating and cooling

1) Test Method:

a) Air volumes for each grille downstream of the unit shall be verified with the TAB contractor using a duct traverse or flow hood measurement.

2) Requirements to facilitate testing:

a) Access to terminal unit and grilles and/or ductwork. (Flow Hood is the preferred method.)

c. Verify heat transfer capacity in accordance with the AHU, FCU, RTU information above.

7. System verification: Each Pump:

a. Verify control system components including but not limited to sequences of operation, setpoints, time delays, dampers and valves in accordance with the HVAC Control System information above.

b. Verify volume, head pressure, impeller diameter

c. Test Method:

1) Differential pressure across the pump shall be verified with the TAB contractor and compared to the manufacturer's performance curve at shut-off and the systems designed differential pressure setpoint.

2) Requirements to facilitate testing:

a) Pressure/temperature ports immediately before and after the pump.

b) Differential pressure setpoint used during the TAB. (Note: This should be the lowest differential pressure that maintain the system balance requirements, and is determined during TAB.)

d. Verify motor HP, amps, volts, RPM

1) Test Method:
   a) While at maximum design conditions, these values will be verified with the TAB contractor and their previously used calibrated test instruments.

2) Requirements to facilitate testing: No specific requirements

e. Verify VFDs in accordance with the AHU, FCU, RTU information above.

8. System verification: Each supply fan, exhaust fan or outside air fan:

a. Verify control system components including but not limited to sequences of operation, setpoints, time delays, dampers and valves in accordance with the HVAC Control System information above.
b. Verify minimum / maximum air volume in accordance with the AHU, FCU, RTU information above.
c. Verify motor(s) HP, amps and volts in accordance with the AHU, FCU, RTU information above.
d. Verify motor and fan RPM in accordance with the AHU, FCU, RTU information above.
e. Verify VFDs in accordance with the AHU, FCU, RTU information above.

C. Photo Documentation of Valves:

1. All automatic flow control balancing valves, manual balancing valves and motorized control valves shall be photographed in their installed position prior to insulation installation. The pictures shall include the nameplate of the associated equipment and the nameplate of the valve with the manufacturer, model, volume and flow direction clearly visible. Additional pictures shall be taken as necessary to clearly illustrate the valves position in the piping relative to the surrounding equipment and devices.
2. All valves shall be equipped with a valve tag and match the valve chart.

3.19 PROTECTION OF MATERIALS AND EQUIPMENT

A. Requirements: Do not store fiberglass insulation or any equipment within the building until it has been "dried in". If dry space is unavailable and the insulation and equipment must be installed or stored before the building is "dried in" and completely enclosed, provide polyethylene film cover for protection.

B. Replacement of Damaged Stored Material and Equipment: Any material and equipment that has been wet or otherwise damaged prior to installation shall be replaced with new material regardless of the condition of the material and equipment at the time of installation.

C. Repair of Damaged Installed Material and Equipment: After installation correct or repair dents, scratches and other visible blemishes. At the direction of Engineer replace or repair to "as new" condition equipment which has been damaged during construction.

3.20 COORDINATION OF SERVICES

A. Interruption of services: Provide shutoff valves at points of interconnection to minimize downtime.

END OF SECTION 23 00 10

SECTION 23 05 00 - COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Piping materials and installation instructions common to most piping systems.
2. Dielectric fittings.
3. Mechanical sleeve seals.
4. Sleeves.
5. Escutcheons.
6. Grout.
7. Equipment installation requirements common to equipment sections.
8. Painting and finishing.
9. Concrete bases.
10. Supports and anchorages.

1.3 DEFINITIONS

A. Finished Spaces: Spaces other than mechanical and electrical equipment rooms, furred spaces, pipe and duct chases, unheated spaces immediately below roof, spaces above ceilings, unexcavated spaces, crawlspaces, and tunnels.

B. Exposed, Interior Installations: Exposed to view indoors. Examples include finished occupied spaces and mechanical equipment rooms.

C. Exposed, Exterior Installations: Exposed to view outdoors or subject to outdoor ambient temperatures and weather conditions. Examples include rooftop locations.

D. Concealed, Interior Installations: Concealed from view and protected from physical contact by building occupants. Examples include above ceilings and chases.

E. Concealed, Exterior Installations: Concealed from view and protected from weather conditions and physical contact by building occupants but subject to

outdoor ambient temperatures. Examples include installations within unheated shelters.

F. The following are industry abbreviations for plastic materials:

1. CPVC: Chlorinated polyvinyl chloride plastic.
2. PVC: Polyvinyl chloride plastic.

G. The following are industry abbreviations for rubber materials:

1. EPDM: Ethylene-propylene-diene terpolymer rubber.
2. NBR: Acrylonitrile-butadiene rubber.

1.4 SUBMITTALS

A. Product Data: For the following:

1. Dielectric fittings.
2. Mechanical sleeve seals.
3. Escutcheons.

B. Welding certificates.

1.5 QUALITY ASSURANCE

A. Steel Support Welding: Qualify processes and operators according to AWS D1.1, "Structural Welding Code--Steel."

B. Steel Pipe Welding: Qualify processes and operators according to ASME Boiler and Pressure Vessel Code: Section IX, "Welding and Brazing Qualifications."

1. Comply with provisions in ASME B31 Series, "Code for Pressure Piping."

2. Certify that each welder has passed AWS qualification tests for welding processes involved and that certification is current.

C. Electrical Characteristics for HVAC Equipment: Equipment of higher electrical characteristics may be furnished provided such proposed equipment is approved in writing and connecting electrical services, circuit breakers, and conduit sizes are appropriately modified. If minimum energy ratings or efficiencies are specified, equipment shall comply with requirements.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver pipes and tubes with factory-applied end caps. Maintain end caps through shipping, storage, and handling to prevent pipe end damage and to prevent entrance of dirt, debris, and moisture.

B. Store plastic pipes protected from direct sunlight. Support to prevent sagging and bending.

1.7 COORDINATION

A. Arrange for pipe spaces, chases, slots, and openings in building structure during progress of construction, to allow for HVAC installations.

B. Coordinate installation of required supporting devices and set sleeves in poured-in-place concrete and other structural components as they are constructed.

C. Coordinate requirements for access panels and doors for HVAC items requiring access that are concealed behind finished surfaces. Access panels and doors are specified in Division 08 Section "Access Doors and Frames."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:

1. Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, the manufacturers specified.

2.2 PIPE, TUBE, AND FITTINGS

A. Refer to individual Division 23 piping Sections for pipe, tube, and fitting materials and joining methods.

B. Pipe Threads: ASME B1.20.1 for factory-threaded pipe and pipe fittings.

2.3 JOINING MATERIALS

A. Refer to individual Division 23 piping Sections for special joining materials not listed below.

B. Pipe-Flange Gasket Materials: Suitable for chemical and thermal conditions of piping system contents.

1. ASME B16.21, nonmetallic, flat, asbestos-free, 1/8-inch maximum thickness unless thickness or specific material is indicated.

a. Full-Face Type: For flat-face, Class 125, cast-iron and cast-bronze flanges.
b. Narrow-Face Type: For raised-face, Class 250, cast-iron and steel flanges.

2. AWWA C110, rubber, flat face, 1/8 inch thick, unless otherwise indicated; and full-face or ring type, unless otherwise indicated.

C. Flange Bolts and Nuts: ASME B18.2.1, carbon steel, unless otherwise indicated.

D. Plastic, Pipe-Flange Gasket, Bolts, and Nuts: Type and material recommended by piping system manufacturer, unless otherwise indicated.

E. Solder Filler Metals: ASTM B 32, lead-free alloys. Include water-flushable flux according to ASTM B 813.

F. Brazing Filler Metals: AWS A5.8, BCuP Series, copper-phosphorus alloys for general-duty brazing, unless otherwise indicated; and AWS A5.8, BAg1, silver alloy for refrigerant piping, unless otherwise indicated.

G. Welding Filler Metals: Comply with AWS D10.12 for welding materials appropriate for wall thickness and chemical analysis of steel pipe being welded.

H. Solvent Cements for Joining Plastic Piping:

1. CPVC Piping: ASTM F 493.
2. PVC Piping: ASTM D 2564. Include primer according to ASTM F 656.

2.4 DIELECTRIC FITTINGS

A. Description: Combination fitting of copper alloy and ferrous materials with threaded, solder-joint, plain, or weld-neck end connections that match piping system materials.

B. Insulating Material: Suitable for system fluid, pressure, and temperature.

C. Dielectric Unions: Factory-fabricated, union assembly, for 250-psig minimum working pressure at 180 deg F.

1. Manufacturers:

a. Epco Sales, Inc.
b. Watts Industries, Inc.; Water Products Div.
c. Zurn Industries, Inc.; Wilkins Div.

D. Dielectric Flanges: Factory-fabricated, companion-flange assembly, for 150- or 300-psig minimum working pressure as required to suit system pressures.

1. Manufacturers:

a. Capitol Manufacturing Co.
b. Epco Sales, Inc.
c. Watts Industries, Inc.; Water Products Div.

E. Dielectric-Flange Kits: Companion-flange assembly for field assembly. Include flanges, full-face- or ring-type neoprene or phenolic gasket, phenolic or polyethylene bolt sleeves, phenolic washers, and steel backing washers.

1. Manufacturers:

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Central Plastics Company.
d. Pipeline Seal and Insulator, Inc.

2. Separate companion flanges and steel bolts and nuts shall have 150- or 300-psig minimum working pressure where required to suit system pressures.

F. Dielectric Couplings: Galvanized-steel coupling with inert and noncorrosive, thermoplastic lining; threaded ends; and 300-psig minimum working pressure at 225 deg F.

1. Manufacturers:

a. Calpico, Inc.
b. Lochinvar Corp.

G. Dielectric Nipples: Electroplated steel nipple with inert and noncorrosive, thermoplastic lining; plain, threaded, or grooved ends; and 300-psig minimum working pressure at 225 deg F.

1. Manufacturers:

a. Perfection Corp.
b. Precision Plumbing Products, Inc.
c. Sioux Chief Manufacturing Co., Inc.
d. Victaulic Co. of America.

2.5 MECHANICAL SLEEVE SEALS

A. Description: Modular sealing element unit, designed for field assembly, to fill annular space between pipe and sleeve.

1. Manufacturers:

a. Advance Products & Systems, Inc.
b. Calpico, Inc.
c. Metraflex Co.
d. Pipeline Seal and Insulator, Inc.

2. Sealing Elements: EPDM interlocking links shaped to fit surface of pipe. Include type and number required for pipe material and size of pipe.
3. Pressure Plates: Plastic. Include two for each sealing element.

4. Connecting Bolts and Nuts: Carbon steel with corrosion-resistant coating of length required to secure pressure plates to sealing elements. Include one for each sealing element.

2.6 SLEEVES

A. Galvanized-Steel Sheet: 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint.

B. Steel Pipe: ASTM A 53, Type E, Grade B, Schedule 40, galvanized, plain ends.

C. Cast Iron: Cast or fabricated "wall pipe" equivalent to ductile-iron pressure pipe, with plain ends and integral waterstop, unless otherwise indicated.

D. Stack Sleeve Fittings: Manufactured, cast-iron sleeve with integral clamping flange. Include clamping ring and bolts and nuts for membrane flashing.

1. Underdeck Clamp: Clamping ring with set screws.

2.7 ESCUTCHEONS

A. Description: Manufactured wall and ceiling escutcheons and floor plates, with an ID to closely fit around pipe, tube, and insulation of insulated piping and an OD that completely covers opening.

B. One-Piece, Deep-Pattern Type: Deep-drawn, box-shaped brass with polished chrome-plated finish.

C. One-Piece, Cast-Brass Type: With set screw.

1. Finish: Rough brass.

D. Split-Casting, Cast-Brass Type: With concealed hinge and set screw.

1. Finish: Rough brass.

E. One-Piece, Stamped-Steel Type: With set screw or spring clips and chrome-plated finish.

F. Split-Plate, Stamped-Steel Type: With exposed-rivet hinge and chrome-plated finish.

2.8 GROUT

A. Description: ASTM C 1107, Grade B, nonshrink and nonmetallic, dry hydraulic-cement grout.

1. Characteristics: Post-hardening, volume-adjusting, nonstaining, noncorrosive, nongaseous, and recommended for interior and exterior applications.

2. Design Mix: 5000-psi, 28-day compressive strength.

3. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 PIPING SYSTEMS - COMMON REQUIREMENTS

A. Install piping according to the following requirements and Division 23 Sections specifying piping systems.

B. Drawing plans, schematics, and diagrams indicate general location and arrangement of piping systems. Indicated locations and arrangements were used to size pipe and calculate friction loss, expansion, pump sizing, and other design considerations. Install piping as indicated unless deviations to layout are approved on Coordination Drawings.

C. Install piping in concealed locations, unless otherwise indicated and except in equipment rooms and service areas.

D. Install piping indicated to be exposed and piping in equipment rooms and service areas at right angles or parallel to building walls. Diagonal runs are prohibited unless specifically indicated otherwise.

E. Install piping above accessible ceilings to allow sufficient space for ceiling panel removal.

F. Install piping to permit valve servicing.

G. Install piping at indicated slopes.

H. Install piping free of sags and bends.

I. Install fittings for changes in direction and branch connections.

J. Install piping to allow application of insulation.

K. Select system components with pressure rating equal to or greater than system operating pressure.

L. Install escutcheons for penetrations of walls, ceilings, and floors according to the following:

1. New Piping:

a. Piping with Fitting or Sleeve Protruding from Wall: One-piece, deep-pattern type.
b. Insulated Piping: One-piece, stamped-steel type with spring clips.
c. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
d. Bare Piping at Wall and Floor Penetrations in Finished Spaces: One-piece, stamped-steel type.
e. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, cast-brass type with polished chrome-plated finish.
f. Bare Piping at Ceiling Penetrations in Finished Spaces: One-piece, stamped-steel type and set screw.

M. Sleeves are not required for core-drilled holes.

N. Install sleeves for pipes passing through concrete and masonry walls, gypsum-board partitions, and concrete floor and roof slabs.

1. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level. Extend cast-iron sleeve fittings below floor slab as required to secure clamping ring if ring is specified.

2. Install sleeves in new walls and slabs as new walls and slabs are constructed.

3. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation. Use the following sleeve materials:

a. Steel Pipe Sleeves: For pipes smaller than NPS 6.

b. Steel Sheet Sleeves: For pipes NPS 6 and larger, penetrating gypsum-board partitions.

c. Stack Sleeve Fittings: For pipes penetrating floors with membrane waterproofing. Secure flashing between clamping flanges. Install section of cast-iron soil pipe to extend sleeve to 2 inches above finished floor level. Refer to Division 07 Section "Sheet Metal Flashing and Trim" for flashing.

1) Seal space outside of sleeve fittings with grout.

4. Except for underground wall penetrations, seal annular space between sleeve and pipe or pipe insulation, using joint sealants appropriate for size, depth, and location of joint. Refer to Division 07 Section "Joint Sealants" for materials and installation.

O. Aboveground, Exterior-Wall Pipe Penetrations: Seal penetrations using sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Install steel pipe for sleeves smaller than 6 inches in diameter.
2. Install cast-iron "wall pipes" for sleeves 6 inches and larger in diameter.
3. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

P. Underground, Exterior-Wall Pipe Penetrations: Install cast-iron "wall pipes" for sleeves. Seal pipe penetrations using mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

1. Mechanical Sleeve Seal Installation: Select type and number of sealing elements required for pipe material and size. Position pipe in center of sleeve. Assemble mechanical sleeve seals and install in annular space between pipe and sleeve. Tighten bolts against pressure plates that cause sealing elements to expand and make watertight seal.

Q. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Refer to Division 07 Section "Penetration Firestopping" for materials.

R. Verify final equipment locations for roughing-in.

S. Refer to equipment specifications in other Sections of these Specifications for roughing-in requirements.

3.2 PIPING JOINT CONSTRUCTION

A. Join pipe and fittings according to the following requirements and Division 23 Sections specifying piping systems.

B. Ream ends of pipes and tubes and remove burrs. Bevel plain ends of steel pipe.

C. Remove scale, slag, dirt, and debris from inside and outside of pipe and fittings before assembly.

D. Soldered Joints: Apply ASTM B 813, water-flushable flux, unless otherwise indicated, to tube end. Construct joints according to ASTM B 828 or CDA's "Copper Tube Handbook," using lead-free solder alloy complying with ASTM B 32.

E. Brazed Joints: Construct joints according to AWS's "Brazing Handbook," "Pipe and Tube" Chapter, using copper-phosphorus brazing filler metal complying with AWS A5.8.

F. Threaded Joints: Thread pipe with tapered pipe threads according to ASME B1.20.1. Cut threads full and clean using sharp dies. Ream threaded pipe ends to remove burrs and restore full ID. Join pipe fittings and valves as follows:

1. Apply appropriate tape or thread compound to external pipe threads unless dry seal threading is specified.
2. Damaged Threads: Do not use pipe or pipe fittings with threads that are corroded or damaged. Do not use pipe sections that have cracked or open welds.

G. Welded Joints: Construct joints according to AWS D10.12, using qualified processes and welding operators according to Part 1 "Quality Assurance" Article.

H. Flanged Joints: Select appropriate gasket material, size, type, and thickness for service application. Install gasket concentrically positioned. Use suitable lubricants on bolt threads.

I. Plastic Piping Solvent-Cement Joints: Clean and dry joining surfaces. Join pipe and fittings according to the following:

1. Comply with ASTM F 402 for safe-handling practice of cleaners, primers, and solvent cements.
2. CPVC Piping: Join according to ASTM D 2846/D 2846M Appendix.
3. PVC Nonpressure Piping: Join according to ASTM D 2855.

3.3 PIPING CONNECTIONS

A. Make connections according to the following, unless otherwise indicated:

1. Install unions, in piping NPS 2 and smaller, adjacent to each valve and at final connection to each piece of equipment.
2. Install flanges, in piping NPS 2-1/2 and larger, adjacent to flanged valves and at final connection to each piece of equipment.
3. Wet Piping Systems: Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals.

3.4 EQUIPMENT INSTALLATION - COMMON REQUIREMENTS

A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.

B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.

C. Install HVAC equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.

D. Install equipment to allow right of way for piping installed at required slope.

3.5 PAINTING

A. Painting of HVAC systems, equipment, and components is specified in Division 09 Sections "Interior Painting" and "Exterior Painting."

B. Damage and Touchup: Repair marred and damaged factory-painted finishes with materials and procedures to match original factory finish.

3.6 CONCRETE BASES

A. Concrete Bases: Anchor equipment to concrete base according to equipment manufacturer's written instructions.

1. Construct concrete bases of dimensions indicated, but not less than 4 inches larger in both directions than supported unit.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of the base.
3. Install epoxy-coated anchor bolts for supported equipment that extend through concrete base, and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use supported equipment manufacturer's setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to supported equipment.
6. Install anchor bolts according to anchor-bolt manufacturer's written instructions.
7. Use 3000-psi, 28-day compressive-strength concrete and reinforcement as specified in Division 03 Section "Cast-in-Place Concrete."

3.7 ERECTION OF METAL SUPPORTS AND ANCHORAGES

A. Refer to Division 5 Section "Metal Fabrications" for structural steel.

B. Cut, fit, and place miscellaneous metal supports accurately in location, alignment, and elevation to support and anchor HVAC materials and equipment.

C. Field Welding: Comply with AWS D1.1.

3.8 GROUTING

A. Mix and install grout for HVAC equipment base bearing surfaces, pump and other equipment base plates, and anchors.

B. Clean surfaces that will come into contact with grout.

C. Provide forms as required for placement of grout.

D. Avoid air entrapment during placement of grout.

E. Place grout, completely filling equipment bases.

F. Place grout on concrete bases and provide smooth bearing surface for equipment.

G. Place grout around anchors.

H. Cure placed grout.

END OF SECTION 23 05 00

SECTION 23 05 13 - COMMON MOTOR REQUIREMENTS FOR HVAC EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes general requirements for single-phase and polyphase, general-purpose, horizontal, small and medium, squirrel-cage induction motors for use on ac power systems up to 600 V and installed at equipment manufacturer's factory or shipped separately by equipment manufacturer for field installation.

1.3 COORDINATION

A. Coordinate features of motors, installed units, and accessory devices to be compatible with the following:

1. Motor controllers.
2. Torque, speed, and horsepower requirements of the load.
3. Ratings and characteristics of supply circuit and required control sequence.
4. Ambient and environmental conditions of installation location.

PART 2 - PRODUCTS

2.1 GENERAL MOTOR REQUIREMENTS

A. Comply with requirements in this Section except when stricter requirements are specified in HVAC equipment schedules or Sections.

B. Comply with NEMA MG 1 unless otherwise indicated. Motors shall meet “NEMA Premium” Efficiency motor program.

C. Comply with IEEE 841 for severe-duty motors.

2.2 MOTOR CHARACTERISTICS

A. Duty: Continuous duty at ambient temperature of 40 deg C and at sea level.

B. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.

2.3 POLYPHASE MOTORS

A. Description: NEMA MG 1, Design B, medium induction motor.

B. Efficiency: Energy efficient, as defined in NEMA MG 1.

C. Service Factor: 1.15.

D. Multispeed Motors: Variable torque.

1. For motors with 2:1 speed ratio, consequent pole, single winding.
2. For motors with other than 2:1 speed ratio, separate winding for each speed.

E. Rotor: Random-wound, squirrel cage.

F. Bearings: Regreasable, shielded, antifriction ball bearings suitable for radial and thrust loading.

G. Temperature Rise: Match insulation rating.

H. Insulation: Class F.

I. Code Letter Designation:

1. Motors 15 HP and Larger: NEMA starting Code F or Code G.
2. Motors Smaller than 15 HP: Manufacturer's standard starting characteristic.

J. Enclosure Material: Cast iron for motor frame sizes 324T and larger; rolled steel for motor frame sizes smaller than 324T.

2.4 POLYPHASE MOTORS WITH ADDITIONAL REQUIREMENTS

A. Motors Used with Variable Frequency Controllers: Ratings, characteristics, and features coordinated with and approved by controller manufacturer.

1. Windings: Copper magnet wire with moisture-resistant insulation varnish, designed and tested to resist transient spikes, high frequencies, and short time rise pulses produced by pulse-width modulated inverters.
2. Energy- and Premium-Efficient Motors: Class B temperature rise; Class F insulation.
3. Inverter-Duty Motors: Class F temperature rise; Class H insulation.

4. Thermal Protection: Comply with NEMA MG 1 requirements for thermally protected motors.

B. Severe-Duty Motors: Comply with IEEE 841, with 1.15 minimum service factor.

2.5 SINGLE-PHASE MOTORS

A. Motors larger than 1/20 hp shall be one of the following, to suit starting torque and requirements of specific motor application:

1. Permanent-split capacitor.

B. Multispeed Motors: Variable-torque, permanent-split-capacitor type.

C. Bearings: Prelubricated, antifriction ball bearings or sleeve bearings suitable for radial and thrust loading.

D. Motors 1/20 HP and Smaller: Shaded-pole type.

E. Thermal Protection: Internal protection to automatically open power supply circuit to motor when winding temperature exceeds a safe value calibrated to temperature rating of motor insulation. Thermal-protection device shall automatically reset when motor temperature returns to normal range.

PART 3 - EXECUTION

3.1 All equipment with electric motors larger than 10 hp shall be provided with access for a motor lift and provisions to move the lift from the equipment’s location to ground level on the exterior of the building.

END OF SECTION 23 05 13

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SECTION 23 05 14 - VARIABLE FREQUENCY MOTOR CONTROLLERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 DESCRIPTION

A. This specification is to cover a complete Variable Frequency motor Drive (VFD) consisting of a pulse width modulated (PWM) inverter designed for use with a standard NEMA Design B induction motor.

B. The drive manufacturer shall supply the drive and all necessary options, specified. The manufacturer shall have been engaged in the production of this type of equipment for a minimum of ten years. All VFDs installed on this project shall be from the same manufacturer.

1.3 SUMMARY

A. Related Sections:

1. Section 237300 – Custom Indoor Central-Station Air-Handling Units
2. Section 233423 - HVAC Power Ventilators
3. Section 232123 - Hydronic Pumps
4. Section 230900 – Instrumentation and Control For HVAC

B. Section includes separately enclosed, pre-assembled, combination VFCs, rated 600 V and less, for speed control of three-phase, squirrel-cage induction motors.

1.4 REFERENCES

A. Institute of Electrical and Electronics Engineers

1. IEEE C62.41 – Recommended Practice on Surge Voltages in Low-Voltage AC Power Circuits.

B. National Electrical Manufacturers Association

1. NEMA 250 – Enclosures for Electrical Equipment (1000 Volts Maximum).
2. NEMA FU 1 – Low Voltage Cartridge Fuses.
3. NEMA ICS 7 – Industrial Control and Systems: Adjustable Speed Drives.
4. NEMA ICS 7.1 – Safety Standards for Construction and Guide for Selection, Installation, and Operation of Adjustable Speed Drive Systems.

C. International Electrical Testing Association

1. NETA ATS – Acceptance Testing Specifications for Electrical Power Distribution Equipment and Systems.

1.5 SUBMITTALS

A. Shop Drawings: Indicate front and side views of enclosures with overall dimensions and weights shown; conduit entrance locations and requirements; and nameplate legends.

B. Product Data: For each type and rating of VFC indicated. Include the following features:

1. Performance
2. Electrical Ratings
3. Operating Characteristics
4. Dimensioned outline drawing
5. Schematic diagram
6. Component list
7. Power and control connection diagram(s).
8. Bacnet Interface Controller

9. Compliance to IEEE 519 – harmonic analysis for particular jobsite including total harmonic voltage distortion and total harmonic current distortion (TDD).

a. The VFD manufacturer shall provide calculations; specific to this installation, showing total harmonic voltage distortion is less than 5%. Input filters shall be sized and provided as required by the VFD manufacturer to ensure compliance with IEEE standard 519. All VFD's shall include a minimum of 5% impedance reactors.

C. Test Reports: Indicate field test and inspection procedures and test results.

D. Manufacturer's Field Reports: Indicate start-up inspection findings.

E. Harmonic Analysis Study and Report: Comply with IEEE 399 and NETA Acceptance Testing Specification; indentify the effects of nonlinear loads and their associated harmonic contributions on the voltages and currents throughout the electrical system. Analyze possible operating scenarios, including recommendations for VFC input filtering to limit TDD and THD (V) at each VFC to specified levels.

1.6 CLOSEOUT SUBMITTALS

A. Section 01 - Execution and closeout requirements.

B. Provide final equipment submittal information with all noted corrections incorporated.

C. Field quality-control reports.

D. Operation and Maintenance Data: Submit instructions complying with NEMA ICS 7.1. Include procedures for starting and operating controllers, and describe operating limits possibly resulting in hazardous or unsafe conditions. Include routine preventive maintenance schedule.

1. Manufacturer's written instructions for testing and adjusting thermal-magnetic circuit breaker and MCP trip setting.
2. Manufacturer's written instructions for setting field-adjustable overload relays.
3. Manufacturer's written instructions for testing, adjusting, and reprogramming microprocessor control modules.
4. Manufacturer's written instructions for setting field-adjustable timers, controls, and status and alarm points.

E. Load Current and List of Settings of Adjustable Overload Relays: Compile after motors have been installed and arrange to demonstrate that switch settings for motor-running overload protection suit actual motor to be protected.

1.7 QUALITY ASSURANCE

A. Refer to calculation and additional testing requirements located within Division 26 and Part 3 of this Section.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

C. QUALITY ASSURANCE

1. Referenced Standards:

a. Institute of Electrical and Electronic Engineers (IEEE)

1) Standard 519-1992, IEEE Guide for Harmonic Content and Control.

b. Underwriters laboratories

1) UL508C

c. National Electrical Manufacturer's Association (NEMA)

1) ICS 7.0, AC Adjustable Speed Drives

d. IEC 16800 Parts 1 and 2

e. National Electric Code (NEC)

1) NEC 430.120, Adjustable-Speed Drive Systems

2. Qualifications:

a. VFDs and options shall be UL listed as a complete assembly. VFD's that require the customer to supply external fuses for the VFD to be UL listed are not acceptable. VFDs with red label UL stickers, requiring additional branch circuit protection are not acceptable. The base VFD shall be UL listed for 100 KAIC without the need for input fuses.

1.8 DELIVERY, STORAGE AND HANDLING

A. Section 01 – Product Requirements: Product storage and handling requirements.

B. Store in clean, dry space. Maintain factory wrapping and provide additional plastic cover to protect units from dirt, water, construction debris, and traffic.

C. Handle in accordance with manufacturer's written instructions. Lift only with lugs provided. Handle carefully to avoid damage to components, enclosure, and finish.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation, capable of driving full load without derating, under the following conditions:

1. Ambient Temperature: Not less than 14 deg. F. and not exceeding 104 deg. F.
2. Ambient Storage Temperature: Not less than minus 4 deg. F. and not exceeding 140 deg. F.
3. Humidity: Less than 95 percent (noncondensing).
4. Altitude: Not exceeding 1000 feet.

B. Conform to NEMA ICS 7 service conditions during and after installation of variable frequency controllers.

1.10 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace VFCs that fail in materials or workmanship within the specified warranty period.

B. Furnish five year manufacturer warranty for variable frequency controller.

1.11 TRAINING

A. Contractor shall provide 16 hours of training to university staff divided into 4 sessions.

B. Training shall be video taped by a licensed videographer. One DVD copy shall be provided to the owner and one DVD copy shall be provided to the commissioning agent for issuance into the commissioning report.

1.12 MAINTENANCE SERVICE

A. Section 01 – Execution and Closeout Requirements: Maintenance service.

B. Furnish service and maintenance of variable frequency controller for one year from Date of Substantial Completion.

PART 2 - PRODUCTS

2.1 VARIABLE FREQUENCY CONTROLLER

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. ABB (ACH 550) Or approved equal.
2. Or approved equal.

2.2 VARIABLE FREQUENCY CONTROLLER

A. The VFD package as specified herein shall be enclosed in a UL Listed Type enclosure, exceeding NEMA enclosure design criteria (enclosures with only NEMA ratings are not acceptable), completely assembled and tested by the manufacturer in an ISO9001 facility. The VFD tolerated voltage window shall allow the VFD to operate from a line of +30% nominal, and -35% nominal voltage as a minimum.

1. Environmental operating conditions: VFDs shall be capable of continuous operation at 0 to 500 C (32 to 1220 F) ambient temperature as per VFD manufacturers documented/submittal data or VFD must be oversized to meet these temperature requirements. Not acceptable are VFD's that can only operate at 40° C intermittently (average during a 24 hour period) and therefore must be oversized. Altitude 0 to 3300 feet above sea level, less than 95% humidity, non-condensing. All circuit boards shall have conformal coating.

B. All VFDs shall have the following standard features:

1. All VFDs shall have the same customer interface, including digital display, and keypad, regardless of horsepower rating. The keypad shall be removable, capable of remote mounting and allow for uploading and downloading of parameter settings as an aid for start-up of multiple VFDs.
2. The keypad shall include Hand-Off-Auto selections and manual speed control. The drive shall incorporate "bumpless transfer" of speed reference when switching between "Hand" and "Auto" modes. There shall be fault reset and "Help" buttons on the keypad. The Help button shall include "on-line" assistance for programming and troubleshooting.
3. There shall be a built-in time clock in the VFD keypad. The clock shall have a battery backup with 10 years minimum life span. The clock shall be used to date and time stamp faults and record operating parameters at the time of fault. If the battery fails, the VFD shall automatically revert to hours of operation since initial power up. Capacitor back-up is not acceptable. The clock shall also be programmable to control start/stop functions, constant speeds, PID parameter

sets and output Form-C relays. The VFD shall have a digital input that allows an override to the time clock (when in the off mode) for a programmable time frame. There shall be four (4) separate, independent timer functions that have both weekday and weekend settings.

4. The VFD's shall utilize pre-programmed application macro's specifically designed to facilitate start-up. The Application Macros shall provide one command to reprogram all parameters and customer interfaces for a particular application to reduce programming time. The VFD shall have two user macros to allow the end-user to create and save custom settings.
5. The VFD shall have cooling fans that are designed for easy replacement. The fans shall be designed for replacement without requiring removing the VFD from the wall or removal of circuit boards. The VFD cooling fans shall operate only when required. To extend the fan and bearing operating life, the VFD shall cycle the cooling fans on and off as required.
6. The VFD shall be capable of starting into a coasting load (forward or reverse) up to full speed and accelerate or decelerate to set point without tripping or component damage (flying start).
7. The VFD shall have the ability to automatically restart after an over-current, over-voltage, under-voltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between attempts shall be programmable.
8. The overload rating of the drive shall be 110% of its normal duty current rating for 1 minute every 10 minutes, 130% overload for 2 seconds. The minimum FLA rating shall meet or exceed the values in the NEC/UL table 430.250 for 4-pole motors.
9. The VFD shall have internal 5% impedance reactors to reduce the harmonics to the power line and to add protection from AC line transients. The 5% impedance may be from dual (positive and negative DC bus) reactors, or 5% AC line reactors. VFD's with only one DC reactor shall add an AC line reactor.
10. The input current rating of the VFD shall be no more than 3% greater than the output current rating. VFD's with higher input current ratings require the upstream wiring, protection devices, and source transformers to be oversized per NEC 430.120. Input and output current ratings must be shown on the VFD nameplate.
11. The VFD shall include a coordinated AC transient surge protection system consisting of 4-120 joule rated MOV's (phase to phase and phase to ground), a capacitor clamp, and 5% impedance reactors.
12. The VFD shall provide a programmable loss-of-load (broken belt / broken coupling) Form-C relay output. The drive shall be programmable to signal the loss-of-load condition via a keypad warning, Form-C relay output, and / or over the serial communications bus. The loss-of-load condition sensing algorithm shall include a programmable time delay that will allow for motor acceleration from zero speed without signaling a false loss-of-load condition.
13. The VFD shall have user programmable underload and overload curve functions to allow user defined indications of broken belt or mechanical failure / jam condition causing motor overload
14. The VFD shall include multiple "two zone" PID algorithms that allow the VFD to maintain PID control from two separate feedback signals (4-20mA, 0-10V, and / or serial communications). The two zone control PID algorithm will control motor

speed based on a minimum, maximum, or average of the two feedback signals. All of the VFD PID controllers shall include the ability for “two zone” control.

15. If the input reference (4-20mA or 2-10V) is lost, the VFD shall give the user the option of either (1) stopping and displaying a fault, (2) running at a programmable preset speed, (3) hold the VFD speed based on the last good reference received, or (4) cause a warning to be issued, as selected by the user. The drive shall be programmable to signal this condition via a keypad warning, Form-C relay output and / or over the serial communication bus.
16. The VFD shall have programmable “Sleep” and “Wake up” functions to allow the drive to be started and stopped from the level of a process feedback signal.

C. All VFDs to have the following adjustments:

1. Three (3) programmable critical frequency lockout ranges to prevent the VFD from operating the load continuously at an unstable speed. The lockout range must be fully adjustable, from 0 to full speed.
2. Two (2) PID Set point controllers shall be standard in the drive, allowing pressure or flow signals to be connected to the VFD, using the microprocessor in the VFD for the closed-loop control. The VFD shall have 250 ma of 24 VDC auxiliary power and be capable of loop powering a transmitter supplied by others. The PID set point shall be adjustable from the VFD keypad, analog inputs, or over the communications bus. There shall be two independent parameter sets for the PID controller and the capability to switch between the parameter sets via a digital input, serial communications or from the keypad. The independent parameter sets are typically used for night setback, switching between summer and winter set points, etc.
3. There shall be an independent, second PID loop that can utilize the second analog input and modulate one of the analog outputs to maintain the set point of an independent process (ie. valves, dampers, etc.). All set points, process variables, etc. to be accessible from the serial communication network.
4. Two (2) programmable analog inputs shall accept current or voltage signals.
5. Two (2) programmable analog outputs (0-20ma or 4-20 ma). The outputs may be programmed to output proportional to Frequency, Motor Speed, Output Voltage, Output Current, Motor Torque, Motor Power (kW), DC Bus voltage, Active Reference, Active Feedback, and other data.
6. Six (6) programmable digital inputs for maximum flexibility in interfacing with external devices. All digital inputs shall be programmable to initiate upon an application or removal of 24VDC or 24VAC.
7. Three (3) programmable, digital Form-C relay outputs. The relay outputs shall include programmable on and off delay times and adjustable hysteresis. The relays shall be rated for maximum switching current 8 amps at 24 VDC and 0.4 A at 250 VAC; Maximum voltage 300 VDC and 250 VAC; continuous current rating of 2 amps RMS. Outputs shall be true Form-C type contacts; open collector outputs are not acceptable.
8. Run permissive circuit - There shall be a run permissive circuit for damper or valve control. Regardless of the source of a run command (keypad, input contact closure, time-clock control, or serial communications), the VFD shall provide a dry contact closure that will signal the damper to open (VFD motor does not operate). When the damper is fully open, a normally open dry contact (end-

switch) shall close. The closed end-switch is wired to a VFD digital input and allows VFD motor operation. Two separate safety interlock inputs shall be provided. When either safety is opened, the motor shall be commanded to coast to stop and the damper shall be commanded to close. The keypad shall display “start enable 1 (or 2) missing”. The safety input status shall also be transmitted over the serial communications bus.

9. The VFD control shall include a programmable time delay for VFD start and a keypad indication that this time delay is active. A Form C relay output provides a contact closure to signal the VAV boxes open. This will allow VAV boxes to be driven open before the motor operates. The time delay shall be field programmable from 0 – 120 seconds. Start delay shall be active regardless of the start command source (keypad command, input contact closure, time-clock control, or serial communications), and when switching from drive to bypass.
10. Seven (7) programmable preset speeds.
11. Two independently adjustable accel and decel ramps with 1 – 1800 seconds adjustable time ramps.
12. The VFD shall include a motor flux optimization circuit that will automatically reduce applied motor voltage to the motor to optimize energy consumption and reduce audible motor noise. The VFD shall have selectable software for optimization of motor noise, energy consumption, and motor speed control.
13. The VFD shall include a carrier frequency control circuit that reduces the carrier frequency based on actual VFD temperature that allows higher carrier frequency settings without derating the VFD.
14. The VFD shall include password protection against parameter changes.

D. The Keypad shall include a backlit LCD display. The display shall be in complete English words for programming and fault diagnostics (alpha-numeric codes are not acceptable). All VFD faults shall be displayed in English words. The keypad shall include a minimum of 14 assistants including:

1. Start-up assistant

2. Parameter assistants

   a. PID assistant
   b. Reference assistant
   c. I/O assistant
   d. Serial communications assistant
   e. Option module assistant
   f. Panel display assistant
   g. Low noise set-up assistant

3. Maintenance assistant
4. Troubleshooting assistant
5. Drive optimizer assistants

E. All applicable operating values shall be capable of being displayed in engineering (user) units. A minimum of three operating values from the list below shall be capable of being displayed at all times. The display shall be in complete English words (alpha-numeric codes are not acceptable):

1. Output Frequency
2. Motor Speed (RPM, %, or Engineering units)
3. Motor Current
4. Motor Torque
5. Motor Power (kW)
6. DC Bus Voltage
7. Output Voltage

F. Serial Communications

1. The VFD shall have an EIA-485 port as standard. The standard protocols shall be ASHRAE 135 - BACnet. Each individual drive shall have the protocol in the base VFD. The use of third party gateways and multiplexers is not acceptable. All protocols shall be “certified” BTL Listed for BACnet. Use of non-certified protocols is not allowed.

2. The BACnet connection shall be an EIA-485, MS/TP interface operating at 76.8 Kbps. The connection shall be tested by the BACnet Testing Labs (BTL) and be BTL Listed. The BACnet interface shall conform to the BACnet standard device type of an Applications Specific Controller (B-ASC). The interface shall support all BIBBs defined by the BACnet standard profile for a B-ASC including, but not limited to:

   a. Data Sharing – Read Property – B.
   b. Data Sharing – Write Property – B.
   c. Device Management – Dynamic Device Binding (Who-Is; I-Am).
   d. Device Management – Dynamic Object Binding (Who-Has; I-Have).
   e. Device Management – Communication Control – B.

3. If additional hardware is required to obtain the BACnet interface, the VFD manufacturer shall supply one BACnet gateway per drive. Multiple VFDs sharing one gateway shall not be acceptable.
4. Serial communication capabilities shall include, but not be limited to; run-stop control, speed set adjustment, proportional/integral/derivative PID control adjustments, current limit, accel/decel time adjustments, and lock and unlock the keypad. The drive shall have the capability of allowing the DDC to monitor feedback such as process variable feedback, output speed / frequency, current (in amps), % torque, power (kW), kilowatt hours (resettable), operating hours (resettable), and drive temperature. The DDC shall also be capable of monitoring the VFD relay output status, digital input status, and all analog input and analog output values. All diagnostic warning and fault information shall be transmitted over the serial communications bus. Remote VFD fault reset shall be possible.

5. Serial communication in bypass shall include, but not be limited to; bypass run-stop control, the ability to force the unit to bypass, and the ability to lock and unlock the keypad. The bypass shall have the capability of allowing the DDC to monitor feedback such as, current (in amps), kilowatt hours (resettable), operating hours (resettable), and bypass logic board temperature. The DDC shall also be capable of monitoring the bypass relay output status, and all digital input status. All bypass diagnostic warning and fault information shall be transmitted over the serial communications bus. Remote bypass fault reset shall be possible.
6. The VFD / bypass shall allow the DDC to control the drive and bypass digital and analog outputs via the serial interface. This control shall be independent of any VFD function. The analog outputs may be used for modulating chilled water valves or cooling tower bypass valves. The drive and bypass' digital (Form-C relay) outputs may be used to actuate a damper, open a valve or control any other device that requires a maintained contact for operation. In addition, all of the drive and bypass' digital inputs shall be capable of being monitored by the DDC system. This allows for remote monitoring of which (of up to 4) safeties are open.
7. The VFD shall include an independent PID loop for customer use. The independent PID loop would be used for chilled water value control. Both the VFD PID control loop and the independent PID control loop shall continue functioning even if the serial communications connection is lost. As default, the VFD shall keep the last good set point command and last good DO & AO commands in memory in the event the serial communications connection is lost and continue controlling the process.

G. EMI / RFI filters. All VFD's shall include EMI/RFI filters. The onboard filters shall allow the VFD assembly to be CE Marked and the VFD shall meet product standard EN 61800-3 for the First Environment restricted level with up to 100 feet of motor cable. No Exceptions. Certified test reports shall be provided with the submittals confirming compliance to EN 61800-3, First Environment.

H. All VFD's through 25HP at 480 V shall be protected from input and output power mis-wiring. The VFD shall sense this condition and display an alarm on the keypad. The VFD shall not sustain damage from this power mis-wiring condition.

I. ADDITIONAL FEATURES – Optional features to be furnished and mounted by the drive manufacturer. All optional features shall be UL Listed by the drive manufacturer as a complete assembly and carry a UL508 label.

1. Fieldbus adapters - BACnet IP, shall be provided by adding of an optional card.

J. BYPASS CONTROLLER

1. A complete factory wired and tested bypass system consisting of a door interlocked, padlockable circuit breaker, output contactor, bypass contactor, and fast acting VFD input fuses are required. UL Listed motor overload protection shall be provided in both drive and bypass modes.

2. The bypass enclosure door and VFD enclosure must be mechanically interlocked such that the disconnecting device must be in the “Off” position before either enclosure may be accessed.
3. The VFD and bypass package shall have a UL listed short circuit current rating (SCCR) of 100,000 amps and this rating shall be indicated on the UL data label.
4. Drive Isolation Fuses - To ensure maximum possible bypass operation, fast acting fuses, exclusive to the VFD, shall be provided to allow the VFD to disconnect from the line prior to clearing upstream branch circuit protection. This maintains bypass operation capability in the event of a VFD failure. Bypass designs which have no such fuses, or that incorporate fuses common to both the VFD and the bypass, will not be accepted.
5. The system (VFD and Bypass) tolerated voltage window shall allow the system to operate from a line of +30%, -35% nominal voltage range. The system shall incorporate circuitry that will allow the drive or bypass contactor to remain “sealed in” over this voltage tolerance at a minimum.
6. The bypass shall maintain positive contactor control through the voltage tolerance window of nominal voltage +30%, -35%. This feature is designed to avoid contactor coil failure during brown out / low line conditions and allow for input single phase operation when in the VFD mode. Designs that will not allow input single phase operation in the VFD mode are not acceptable.
7. Motor protection from single phase power conditions - the bypass system must be able to detect a single phase input power condition while running in bypass, disengage the motor in a controlled fashion, and give a single phase input power indication. Bypass systems not incorporating single phase protection in bypass mode are not acceptable.
8. The bypass system shall NOT depend on the VFD for bypass operation. The bypass system shall be designed for standalone operation and shall be completely functional in both Hand and Automatic modes even if the VFD has been removed from the system for repair / replacement. Serial communications shall remain functional even with the VFD removed.
9. Serial communications – the bypass shall be capable of being monitored and controlled via serial communications. Communication shall be through BACnet IP.
10. Serial communication capabilities shall include, but not be limited to; bypass run-stop control; the ability to force the unit to bypass; and the ability to lock and unlock the keypad. The bypass shall have the capability of allowing the DDC to monitor feedback such as, current (in amps), kilowatt hours (resettable), operating hours (resettable), and bypass logic board temperature. The DDC shall also be capable of monitoring the bypass relay output status, and all digital input status. All bypass diagnostic warning and fault information shall be transmitted over the serial communications bus. Remote bypass fault reset shall be possible. The following additional status indications and settings shall be transmitted over the serial communications bus and / or via a Form-C relay output – keypad “Hand” or “Auto” selected, bypass selected, and broken belt indication. The DDC system shall also be able to monitor if the motor is running in the VFD mode or bypass mode over serial communications. A minimum of 50 field serial communications points shall be capable of being monitored in the bypass mode.

11. The bypass serial communications shall allow control of the bypass' digital outputs via the serial interface. This control shall be independent of any bypass function or operating state. The bypass' digital (relay) outputs may be used to actuate a damper, open a valve or control any other device that requires a maintained contact for operation. In addition, all of the bypass' digital inputs shall be capable of being monitored by the DDC system.
12. There shall be an adjustable motor current sensing circuit for the bypass and VFD modes to provide proof of flow (broken belt) indication. The condition shall be indicated on the keypad display, transmitted over the building automation protocol and / or via a Form-C relay output contact closure. The broken belt indication shall be programmable to be a system (drive and bypass) indication. The broken belt condition sensing algorithm shall be programmable to cause only a warning or a fault and / or system shutdown.
13. The digital inputs for the system shall accept 24VAC or 24VDC. The bypass shall incorporate an internally sourced power supply and not require an external control power source. The bypass power board shall supply 250 ma of 24 VDC for use by others to power external devices.
14. There shall be a run permissive circuit for damper or valve control. Regardless of the source of a run command (keypad command, time-clock control, digital input, or serial communications) the bypass shall provide a dry contact closure that will signal the damper to open (motor does not operate). When the damper is fully open, a normally open dry contact (end-switch) shall close. The closed end-switch is wired to a bypass system input and allows motor operation. Up to four separate safety interlock inputs shall be provided. When any safety is opened, the motor shall be commanded to coast to stop, and the damper shall be commanded to close. This feature will also operate in Fireman's override / smoke control mode.
15. The bypass control shall monitor the status of the VFD and bypass contactors and indicate when there is a welded contactor contact or open contactor coil. This failed contactor condition shall be indicated on the bypass LCD display, programmed to fire a Form-C relay output, and / or over the serial communications protocol.
16. The bypass control shall include a programmable time delay for bypass start and keypad indication that this time delay is in process. A Form C relay output provides a contact closure to signal the VAV boxes open. This will allow VAV boxes to be driven open before the motor operates at full speed in the bypass mode. The time delay shall be field programmable from 0 – 120 seconds.

17. There shall be a keypad adjustment to select manual or automatic transfer bypass. The user shall be able to select via keypad programming which drive faults will result in an automatic transfer to the bypass mode and which faults require a manual transfer to bypass. The user may select whether the system shall automatically transfer from drive to bypass mode on the following drive fault conditions:

    a. Over current
    b. Over voltage
    c. Under voltage
    d. Loss of analog input

18. The following operators shall be provided:

    a. Bypass Hand-Off-Auto
    b. Drive mode selector
    c. Bypass mode selector
    d. Bypass fault reset

19. The bypass shall include a two line, 20 character LCD display. The display shall allow the user to access and view:

    a. Energy savings – in US dollars
    b. Bypass motor amps
    c. Bypass input voltage– average and individual phase voltage
    d. Bypass power (kW)
    e. Bypass faults and fault logs
    f. Bypass warnings
    g. Bypass operating time (resettable)
    h. Bypass energy (kilowatt hours – resettable)
    i. I/O status
    j. Parameter settings / programming
    k. Printed circuit board temperature

20. The following indicating lights (LED type) or keypad display indications shall be provided. A test mode or push to test feature shall be provided.

    a. Power-on (Ready)
    b. Run enable
    c. Drive mode selected
    d. Bypass mode selected
    e. Drive running
    f. Bypass running
    g. Drive fault
    h. Bypass fault
    i. Bypass H-O-A mode
    j. Automatic transfer to bypass selected
    k. Safety open
    l. Damper opening
    m. Damper end-switch made

21. The Bypass controller shall have six programmable digital inputs, and five programmable Form-C relay outputs. This I/O allows for a total System (VFD and Bypass) I/O count of 24 points as standard. The bypass I/O shall be available to the BAS / DDC system even with the VFD removed.

    a. The on-board Form-C relay outputs in the bypass shall programmable for any of the following indications.

        1) System started
        2) System running

3) Bypass override enabled
4) Drive fault
5) Bypass fault
6) Bypass H-O-A position
7) Motor proof-of-flow (broken belt)
8) Overload
9) Bypass selected
10) Bypass run
11) System started (damper opening)
12) Bypass alarm
13) Over temperature

22. The bypass shall provide a separate terminal strip for connection of freeze, fire, smoke contacts, and external start command. All external safety interlocks shall remain fully functional whether the system is in VFD or Bypass mode. The remote start/stop contact shall operate in VFD and bypass modes. The terminal strip shall allow for independent connection of up to four (4) unique safety inputs.
23. Class 10, 20, or 30 (programmable) electronic motor overload protection shall be included.

K. Enclosures:

1. Provide the VFD and bypass panels with the appropriate NEMA rated enclosure for the following applications:

   a. Indoors: NEMA 12.
   b. Indoors (mechanical rooms): NEMA 12.
   c. Outdoors (Protected by overhang): NEMA 12 in NEMA 3R enclosure.
   d. Outdoors (exposed to windblown dust or water): NEMA 12 in NEMA 4

2. Provide appropriate ventilation of VFD cabinetry to maintain ambient temperature rating of the drive based upon application. On outdoor installations appropriate ventilation shall be powered ventilation fan(s) and external 12”x12”x1”paper filter arranged so as to not allow paper filter to be exposed to rain.

2.3 SOURCE QUALITY CONTROL

A. Shop, inspect and perform standard productions tests for each controller.

B. Make completed controllers available for inspection at manufacturer’s factory prior to packaging for shipment. Notify the Owner at least seven days before inspection is allowed.

C. Allow witnessing of factory inspections and tests at manufacturer’s test facility. Notify the Owner at least seven days before inspections and tests are scheduled.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Section 01300 – Administrative Requirements: Coordination and project conditions.

B. Verify that building environment can be maintained within the service and ambient temperature and humidity ratings required by the VFD manufacturer

3.2 INSTALLATION

A. Installation shall be the responsibility of the mechanical contractor. The contractor shall install the drive in accordance with the recommendations of the VFD manufacturer as outlined in the VFD installation manual.

B. Power wiring shall be completed by the electrical contractor, to NEC code 430.122 wiring requirements based on the VFD input current. Caution: VFDs supplied without internal reactors have substantially higher input current ratings, which may require larger input power wiring and branch circuit protection. The contractor shall complete all wiring in accordance with the recommendations of the VFD manufacturer as outlined in the installation manual.

C. Install in accordance with NEMA ICS 7.1.

D. Verify that mounting surface for VFDs are ready to receive work. Mount VFDs on the wall or at supports in locations identified on the drawings.

E. Tighten accessible connections and mechanical fasteners after placing controller.

F. Install fuses in fusible switches.

G. Select and install overload heater elements in motor controllers to match installed motor characteristics.

H. Install engraved plastic nameplates in accordance with Section 23 05 53.

I. Neatly type label inside controller door identifying motor served, nameplate horsepower, full load amperes, code letter, service factor, and voltage/phase rating. Place label in clear plastic holder.

J. Ground and bond controller in accordance with Section 26 05 26.

K. Controls installer shall provide all wiring and conduit associated with the control signals into and out of the VFD to the DDC EMS and as required for any motor control interlocks.

3.3 FIELD QUALITY CONTROL

A. Inspect and test in accordance with NETA ATS, except Section 4.

B. Perform inspections and tests listed in NETA ATS, Section 7.16 and NEMA ICS 7.1.

C. Perform power quality analysis per warranty requirements.

3.4 MANUFACTURER'S FIELD SERVICES

A. VFD Start-up: Provide certified factory start-up for each drive by a factory authorized service center representative. A certified start-up form shall be filled out for each drive with a copy provided to the Owner, and a copy kept on file at the manufacturer. The following VFD start-up services are to be provided as a minimum:

1. Service center technician shall be responsible for verifying correct installation, power and control wiring connections, starting-up the drive, and checking out for proper operation.
2. Service center technician shall also provide all final adjustments to meet the specified performance requirements.

3.5 DEMONSTRATION AND TRAINING

A. Provide 16 hours of instruction to be conducted at the project site with manufacturer's representative. The training shall be conducted at 4 hour maximums. Contractor to also provide two sets of VFD operation manuals for use at the training session and then provide to the Owner after completion of the session.

3.6 VARIABLE FREQUENCY DRIVE START-UP SERVICE

A. Provide start-up commissioning of variable frequency drive and optional circuits by factory certified service technician experienced in start-up and repair services. Commissioning personnel shall be the same personnel that will provide factory service and warranty repairs at site. Sales personnel and other agents who are not factory certified technicians for drive field repair not acceptable.

B. Include checking for verification of proper operation and installation and interface wiring to building automation system. Include as a minimum:

1. Verify contractor wire terminations to VFD optional circuitry.
2. Verify proper operation and reliability of VFD, motor being driven and building automation system.
3. Provide up to one hour of Owner/operator training on operation and service diagnostics during commissioning.

4. Measure to verify proper operation on:

a. Motor voltage and frequency. Verify proper motor operation.
b. Control input for proper building automation system interface and control calibration.
c. Calibration check for:
d. Minimum speed.
e. Maximum speed.
f. Acceleration and deceleration rates.

g. Adjust as necessary.

C. Configure VSD for automatic restart after a power failure or after an external fault is cleared.

3.7 COMMISSIONING

A. Refer to Commissioning Specifications, Section 018110, for related commissioning requirements.

B. Contractor shall provide all necessary support to the commissioning team to implement commissioning plan as outlined in Section 018110.

END OF SECTION 23 05 14

SECTION 23 05 17 - SLEEVES AND SLEEVE SEALS FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sleeves.
2. Grout.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Galvanized-Steel-Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, with plain ends.

2.2 GROUT

A. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

B. Characteristics: Nonshrink; recommended for interior and exterior applications.

C. Design Mix: 5000-psi (34.5-MPa), 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION

A. Install sleeves for piping passing through penetrations in floors, partitions, roofs, and walls.

B. Install sleeves in concrete floors, concrete roof slabs, and concrete walls as new slabs and walls are constructed.

1. Permanent sleeves are not required for holes in slabs formed by molded-PE or -PP sleeves.

2. Cut sleeves to length for mounting flush with both surfaces.

a. Exception: Extend sleeves installed in floors of mechanical equipment areas or other wet areas 2 inches above finished floor level.

3. Using grout, seal the space outside of sleeves in slabs and walls without sleeve-seal system.

C. Install sleeves for pipes passing through interior partitions.

1. Cut sleeves to length for mounting flush with both surfaces.
2. Install sleeves that are large enough to provide 1/4-inch annular clear space between sleeve and pipe or pipe insulation.
3. Seal annular space between sleeve and piping or piping insulation; use joint sealants appropriate for size, depth, and location of joint. Comply with requirements for sealants specified in Section 07 "Joint Sealants."

D. Fire-Barrier Penetrations: Maintain indicated fire rating of walls, partitions, ceilings, and floors at pipe penetrations. Seal pipe penetrations with firestop materials. Comply with requirements for firestopping specified in Section 07 "Penetration Firestopping."

3.2 SLEEVE AND SLEEVE-SEAL SCHEDULE

A. Use sleeves and sleeve seals for the following piping-penetration applications:

1. Exterior Concrete Walls above Grade:

a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves.
b. Piping NPS 6 and Larger: Galvanized-steel wall sleeves.

2. Concrete Slabs above Grade:

a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves.
b. Piping NPS 6 and Larger: Galvanized-steel wall sleeves.

3. Interior Partitions:

   a. Piping Smaller Than NPS 6: Galvanized-steel wall sleeves.
   b. Piping NPS 6 and Larger: Galvanized-steel wall sleeves.

END OF SECTION 23 05 17

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SECTION 23 05 19 - METERS AND GAGES FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Thermowells.
2. Dial-type pressure gages.
3. Gage attachments.
4. Test plugs.
5. Test-plug kits.
6. Insertion Electromagnetic flowmeters.
7. Insertion Electromagnetic, thermal-energy meters.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of meter and gage, from manufacturer.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For meters and gages to include in operation and maintenance manuals.

B. Spare Parts:

1. Spare materials shall be provided as a part of this project. In addition to any requirements in the drawings and/or specifications, the following minimum list of items shall be provided:

a. 1 of each type of thermometer
b. 1 of each type of pressure gauge.
c. 1 of each type of P/T port.

PART 2 - PRODUCTS

2.1 FILLED-SYSTEM THERMOMETERS

A. Metal-Case, Industrial-Style, Liquid-in-Glass Thermometers:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Miljoco Corporation.
b. Trerice, H. O. Co.
c. Weiss Instruments, Inc.
d. Winters Instruments - U.S.
e. Weksler.

2. Standard: ASME B40.200.
3. Case: Cast aluminum; 7-inch nominal size unless otherwise indicated.
4. Case Form: Adjustable angle unless otherwise indicated.
5. Tube: Glass with magnifying lens and blue or red organic liquid.
6. Tube Background: Nonreflective aluminum with permanently etched scale markings graduated in deg F.
7. Window: Glass or plastic.

8. Stem: Aluminum and of length to suit installation.

a. Design for Thermowell Installation: Bare stem.

9. Connector: 1-1/4 inches, with ASME B1.1 screw threads.
10. Accuracy: Plus or minus 1 percent of scale range or one scale division, to a maximum of 1.5 percent of scale range.

2.2 PRESSURE GAGES

A. Direct-Mounted, Metal-Case, Dial-Type Pressure Gages:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Miljoco Corporation.
b. Trerice, H. O. Co.
c. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
d. Weiss Instruments, Inc.
e. Weksler.

2. Standard: ASME B40.100.
3. Case: Liquid-filled type; cast aluminum or drawn steel; 4-1/2-inch nominal diameter.
4. Pressure-Element Assembly: Bourdon tube unless otherwise indicated.
5. Pressure Connection: Brass, with NPS 1/4, ASME B1.20.1 pipe threads and bottom-outlet type unless back-outlet type is indicated.
6. Movement: Mechanical, with link to pressure element and connection to pointer.
7. Dial: Nonreflective aluminum with permanently etched scale markings graduated in psi.
8. Pointer: Black metal.
9. Window: Glass or plastic.
10. Ring: Metal.
11. Accuracy: Grade A, plus or minus 1 percent of middle half of scale range.

2.3 GAGE ATTACHMENTS

A. Snubbers: ASME B40.100, brass; with NPS 1/4, ASME B1.20.1 pipe threads and-type surge-dampening device. Include extension for use on insulated piping.

2.4 TEST PLUGS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Flow Design, Inc.
2. Miljoco Corporation.
3. Trerice, H. O. Co.
4. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
5. Weiss Instruments, Inc.

B. Description: Test-station fitting made for insertion into piping tee fitting.

C. Body: Brass or stainless steel with core inserts and gasketed and threaded cap. Include extended stem on units to be installed in insulated piping.

D. Thread Size: NPS 1/4, ASME B1.20.1 pipe thread.

E. Minimum Pressure and Temperature Rating: 500 psig at 200 deg F.

F. Core Inserts: EPDM self-sealing rubber.

2.5 TEST-PLUG KITS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Flow Design, Inc.
2. Miljoco Corporation.
3. Trerice, H. O. Co.
4. Watts Regulator Co.; a div. of Watts Water Technologies, Inc.
5. Weiss Instruments, Inc.

B. Furnish one test-plug kit(s) containing one thermometer(s), one pressure gage and adapter, and carrying case. Thermometer sensing elements, pressure gage, and adapter probes shall be of diameter to fit test plugs and of length to project into piping.

C. Carrying Case: Metal or plastic, with formed instrument padding.

2.6 FLOWMETERS

A. Insertion Electromagnetic Flow Meters:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. ONICON Incorporated

2. Description: Bi-directional Flowmeter with sensor and indicator.
3. Factory programmed and ready for use upon delivery.
4. Scalable pulse output to totalize forward and reverse flow.
5. Separate pulse output for flow rate.
6. Flow Range: Sensor and indicator shall cover operating range of equipment or system served.

7. Sensor: Inline type; for installing between pipe flanges and measuring flow directly in gallons per minute.

   a. Design: Flow metering for measuring electrically conductive liquids.
   b. Wetted metal component: 316 Stainless-steel body, with integral transmitter.
   c. Sensing Method: Electromagnetic Sensing
   d. Flow Range: 0.1 ft/sec to 20 ft/sec (200:1 turndown)
   e. Maximum Pressure Rating: 400 psig.

f. Pressure Drop: Less than 0.1 psi at 12 ft/s velocity in 3” and larger pipes
g. Input Power: 20-28 VDC, 250mA @ 24 VDC
h. Liquid Temperature Range: 15 °F to 250 °F.
i. Ambient Temperature Range: -20 °F to 150 °F.
j. Minimum Temperature Rating: 500 deg F.
k. Integral Transformer: For low-voltage power operation.

8. Accuracy: Plus or minus 1.0 percent for readings from 2 ft/sec to 20 ft/sec and 0.02 percent for below 2 ft/sec.
9. Operating Instructions: Include complete instructions with each flowmeter.

2.7 THERMAL-ENERGY METERS

A. Insertion Electromagnetic, Thermal-Energy Meters:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

   a. ONICON Incorporated.

2. Description: System with insertion electromagnetic flow sensor, temperature sensors, transmitter, indicator, and connecting wiring.

3. Flow Sensor: Bi-directional Flowmeter with corrosion-resistant-metal body and transmitter; for installing in piping.

   a. Design: Total thermal-energy measurement.
   b. Minimum Pressure Rating: 150 psig.
   c. Minimum Temperature Range: 40 to 250 deg F.

4. Temperature Sensors: Insertion-type transducer.

5. Indicator: Solid-state, integrating-type meter; for wall mounting.

   a. Data Output: Six-digit electromechanical counter with readout in kilowatts per hour or British thermal units.
   b. Battery Pack: Five-year lithium battery.

6. Accuracy: Plus or minus 1 percent.
7. Display: Visually indicates total fluid volume in gallons and thermal-energy flow in kilowatts per hour or British thermal units.
8. Strainer: Full size of main line piping.
9. Operating Instructions: Include complete instructions with each thermal-energy meter system.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install thermowells with socket extending to center of pipe and in vertical position in piping tees.

B. Install duct-thermometer mounting brackets in walls of ducts. Attach to duct with screws.

C. Install direct-mounted pressure gages in piping tees with pressure gage located on pipe at the most readable position.

D. Install valve and snubber in piping for each pressure gage for fluids (except steam).

E. Install valve and syphon fitting in piping for each pressure gage for steam.

F. Install test plugs in piping tees.

G. Install flow indicators in piping systems in accessible positions for easy viewing.

H. Assemble and install connections, tubing, and accessories between flow-measuring elements and flowmeters according to manufacturer's written instructions.

I. Install flowmeter elements in accessible positions in piping systems.

J. Install permanent indicators on walls or brackets in accessible and readable positions.

K. Install connection fittings in accessible locations for attachment to portable indicators.

L. Mount thermal-energy meters on wall if accessible; if not, provide brackets to support meters.

M. Install thermometers in the following locations:

1. At the supply and return CHW risers to the building
2. At the supply and return CHW risers to the CEP building
3. At each AHU CHWS and CHWR mains.
4. At each Chiller CHWS and CHWR main.
5. At each Chiller CWS and CWR main.
6. At each Cooling Tower CWS.
7. At each Cooling Tower CWR.
8. Where indicated in other specification sections and drawing details.

N. Install pressure gages in the following locations:

1. At the supply and return CHW risers to the building
2. At the supply and return CHW risers to the CEP building
3. Suction and discharge of each pump (Pressure gauge for each pump can be one gauge, valved three ways.)
4. Upstream of each pump strainer (Pressure gauge for each pump can be one gauge, valved three ways.)
5. At each AHU CHWS and CHWR mains.
6. At each Chiller CHWS and CHWR main.
7. At each Chiller CWS and CWR main.
8. At each Cooling Tower CWS.
9. At each Cooling Tower CWR.
10. At DP sensors.
11. Where indicated in other specification sections and drawing details.

O. Install pressure/temperature test ports in the following locations:

1. Adjacent to each Pressure gauge.
2. Adjacent to Temperature gauges.
3. At each coil inlet and outlet.
4. At each balance valve for T&B.
5. Upstream and downstream of each strainer.
6. At each device, where required by the device manufacture for proper operation and confirmation of device performance by a T&B company.
7. At devices for Commissioning. See Commissioning Requirements.
8. Where indicated in other specification sections and drawing details.

3.2 CONNECTIONS

A. Install meters and gages adjacent to machines and equipment to allow service and maintenance of meters, gages, machines, and equipment.

B. Connect flowmeter-system elements to meters.

C. Connect flowmeter transmitters to meters.

3.3 ADJUSTING

A. After installation, calibrate meters according to manufacturer's written instructions.

B. Adjust faces of meters and gages to proper angle for best visibility.

3.4 PRESSURE-GAGE SCHEDULE

A. Pressure gages at suction and discharge of each pump shall be the following:

1. Liquid-filled, direct-mounted, metal case.
2. Test plug with EPDM self-sealing rubber inserts.

3.5 PRESSURE-GAGE SCALE-RANGE SCHEDULE

A. Scale Range for Chilled-Water Piping: 0 to 30 psi.

3.6 FLOWMETER SCHEDULE

A. Flowmeters for Chilled-Water Piping: Insertion Electromagnetic type.

3.7 THERMAL-ENERGY METER SCHEDULE

A. Thermal-Energy Meters for Chilled-Water Piping: Insertion Electromagnetic type.

END OF SECTION 23 05 19

SECTION 23 05 23 - GENERAL-DUTY VALVES FOR HVAC PIPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Bronze ball valves.
2. Iron ball valves.
3. Iron, single-flange butterfly valves.
4. Bronze swing check valves.
5. Iron swing check valves.
6. Bronze gate valves.
7. Iron gate valves.

B. Related Sections:

1. Division 23 HVAC piping Sections for specialty valves applicable to those Sections only.
2. Division 23 Section "Identification for HVAC Piping and Equipment" for valve tags and schedules.

1.3 DEFINITIONS

A. CWP: Cold working pressure.

B. EPDM: Ethylene propylene copolymer rubber.

C. NBR: Acrylonitrile-butadiene, Buna-N, or nitrile rubber.

D. NRS: Nonrising stem.

E. OS&Y: Outside screw and yoke.

F. RS: Rising stem.

G. SWP: Steam working pressure.

1.4 SUBMITTALS

A. Product Data: For each type of valve indicated.

1.5 QUALITY ASSURANCE

A. Source Limitations for Valves: Obtain each type of valve from single source from single manufacturer.

B. ASME Compliance:

1. ASME B16.10 and ASME B16.34 for ferrous valve dimensions and design criteria.
2. ASME B31.1 for power piping valves.
3. ASME B31.9 for building services piping valves.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Prepare valves for shipping as follows:

1. Protect internal parts against rust and corrosion.
2. Protect threads, flange faces, grooves, and weld ends.
3. Set angle, gate, and globe valves closed to prevent rattling.
4. Set ball and plug valves open to minimize exposure of functional surfaces.
5. Set butterfly valves closed or slightly open.
6. Block check valves in either closed or open position.

B. Use the following precautions during storage:

1. Maintain valve end protection.
2. Store valves indoors and maintain at higher than ambient dew point temperature. If outdoor storage is necessary, store valves off the ground in watertight enclosures.

C. Use sling to handle large valves; rig sling to avoid damage to exposed parts. Do not use handwheels or stems as lifting or rigging points.

PART 2 - PRODUCTS

2.1 GENERAL REQUIREMENTS FOR VALVES

A. Refer to HVAC valve schedule articles for applications of valves.

B. Valve Pressure and Temperature Ratings: Not less than indicated and as required for system pressures and temperatures.

C. Valve Sizes: Same as upstream piping unless otherwise indicated.

D. Valve Actuator Types:

1. Gear Actuator: For quarter-turn valves NPS 8 and larger.
2. Handwheel: For valves other than quarter-turn types.
3. Handlever: For quarter-turn valves NPS 6 and smaller except plug valves.
4. Wrench: For plug valves with square heads. Furnish Owner with 1 wrench for every 15 plug valves, for each size square plug-valve head.
5. Chainwheel: Device for attachment to valve handwheel, stem, or other actuator; of size and with chain for mounting height, as indicated in the "Valve Installation" Article.

E. Valves in Insulated Piping: With 2-inch stem extensions and the following features:

1. Gate Valves: With rising stem.
2. Ball Valves: With extended operating handle of non-thermal-conductive material, and protective sleeve that allows operation of valve without breaking the vapor seal or disturbing insulation.
3. Butterfly Valves: With extended neck.

F. Valve-End Connections:

1. Flanged: With flanges according to ASME B16.1 for iron valves.
2. Grooved: With grooves according to AWWA C606.
3. Solder Joint: With sockets according to ASME B16.18.
4. Threaded: With threads according to ASME B1.20.1.

G. Valve Bypass and Drain Connections: MSS SP-45.

2.2 BRONZE ANGLE VALVES

A. Class 125, Bronze Angle Valves with Bronze Disc:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following (Valves must be American Made):

a. Hammond Valve.
b. Milwaukee Valve Company.

2. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 200 psig.

c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded to 2”, Flanged 2” and greater.
e. Stem and Disc: Bronze.
f. Packing: Asbestos free.
g. Handwheel: Malleable iron, bronze, or aluminum.

B. Class 150, Bronze Angle Valves with Bronze Disc (Valves must be American Made):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.; Crane Valve Group; Stockham Division.
b. Kitz Corporation.

2. Description:

a. Standard: MSS SP-80, Type 1.
b. CWP Rating: 300 psig.
c. Body Material: ASTM B 62, bronze with integral seat and union-ring bonnet.
d. Ends: Threaded.
e. Stem and Disc: Bronze.
f. Packing: Asbestos free.
g. Handwheel: Malleable iron, bronze, or aluminum.

2.3 BRONZE BALL VALVES

A. Two-Piece, Full-Port, Bronze Ball Valves with Bronze Trim (Valves must be American Made):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Valve, Inc.
b. Conbraco Industries, Inc.; Apollo Valves.
c. Crane Co.; Crane Valve Group; Crane Valves.
d. Milwaukee Valve Company.
e. NIBCO INC.
f. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-110.
b. SWP Rating: 150 psig.
c. CWP Rating: 600 psig.
d. Body Design: Two piece.
e. Body Material: Bronze.

f. Ends: Threaded to 2”, Flanged 2” and greater.
g. Seats: PTFE or TFE.
h. Stem: Bronze.
i. Ball: Chrome-plated brass.
j. Port: Full.

2.4 IRON, SINGLE-FLANGE BUTTERFLY VALVES

A. 150 CWP, Iron, Single-Flange Butterfly Valves with EPDM Seat and Aluminum-Bronze Disc (Valves must be American Made):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Bray Controls; a division of Bray International.
b. Conbraco Industries, Inc.; Apollo Valves.
c. Cooper Cameron Valves; a division of Cooper Cameron Corp.
d. Crane Co.; Crane Valve Group; Jenkins Valves.
e. Crane Co.; Crane Valve Group; Stockham Division.
f. Kitz Corporation.
g. Milwaukee Valve Company.
h. NIBCO INC.
i. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-67, Type I.
b. CWP Rating: 150 psig.
c. Body Design: Wafer Lug type; suitable for bidirectional dead-end service at rated pressure without use of downstream flange.
d. Body Material: ASTM A 126, cast iron or ASTM A 536, ductile iron.
e. Seat: EPDM.
f. Stem: One- or two-piece stainless steel.
g. Disc: Aluminum bronze.

2.5 BRONZE SWING CHECK VALVES

A. Class 125, Bronze Swing Check Valves with Bronze Disc (Valves must be American Made):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. American Valve, Inc. Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Division.

d. Kitz Corporation.
e. Milwaukee Valve Company.
f. NIBCO INC.
g. Powell Valves.
h. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-80, Type 3.
b. CWP Rating: 200 psig.
c. Body Design: Horizontal flow.
d. Body Material: ASTM B 62, bronze.
e. Ends: Threaded to 2”, Flanged 2” and greater.
f. Disc: Bronze.

2.6 IRON SWING CHECK VALVES

A. Class 125, Iron Swing Check Valves with Metal Seats (Valves must be American Made):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Division.
d. Hammond Valve.
e. Kitz Corporation.
f. Milwaukee Valve Company.
g. NIBCO INC.
h. Powell Valves.
i. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
j. Keckley.

2. Description:

a. Standard: MSS SP-71, Type I.
b. NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.
c. NPS 14 to NPS 24, CWP Rating: 150 psig.
d. Body Design: Clear or full waterway.
e. Body Material: ASTM A 126, gray iron with bolted bonnet.
f. Ends: Threaded to 2”, Flanged 2” and greater.
g. Trim: Bronze.
h. Gasket: Asbestos free.

B. Class 125, Iron, Compact-Wafer, Center-Guided Check Valves with Resilient Seat (Valves must be American Made):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Crispin Valve.
   b. DFT Inc.
   c. Flo Fab Inc.
   d. Milwaukee Valve Company.
   e. NIBCO INC.

2. Description:

   a. Standard: MSS SP-125.
   b. NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.
   c. NPS 14 to NPS 24, CWP Rating: 150 psig.
   d. Body Material: ASTM A 126, gray iron.
   e. Style: Compact wafer.
   f. Seat: EPDM.

2.7 BRONZE GATE VALVES

A. Class 125, NRS Bronze Gate Valves (Valves must be American Made):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Crane Co.; Crane Valve Group; Crane Valves.
   b. Crane Co.; Crane Valve Group; Jenkins Valves.
   c. Crane Co.; Crane Valve Group; Stockham Division.
   d. Kitz Corporation.
   e. Milwaukee Valve Company.
   f. NIBCO INC.
   g. Powell Valves.
   h. Watts Regulator Co.; a division of Watts Water Technologies, Inc.
   i. Zy-Tech Global Industries, Inc.

2. Description:

   a. Standard: MSS SP-80, Type 1.
   b. CWP Rating: 200 psig.
   c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
   d. Ends: Threaded to 2”, Flanged 2” and greater.
   e. Stem: Bronze.
   f. Disc: Solid wedge; bronze.
   g. Packing: Asbestos free.
   h. Handwheel: Malleable iron, bronze, or aluminum.

2.8 IRON GATE VALVES

A. Class 125, NRS, Iron Gate Valves (Valves must be American Made):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Jenkins Valves.
c. Crane Co.; Crane Valve Group; Stockham Division.
d. Flo Fab Inc.
e. Kitz Corporation.
f. Legend Valve.
g. Milwaukee Valve Company.
h. NIBCO INC.
i. Powell Valves.
j. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-70, Type I.
b. NPS 2-1/2 to NPS 12, CWP Rating: 200 psig.
c. NPS 14 to NPS 24, CWP Rating: 150 psig.
d. Body Material: ASTM A 126, gray iron with bolted bonnet.
e. Ends: Threaded to 2”, Flanged 2” and greater.
f. Trim: Bronze.
g. Disc: Solid wedge.
h. Packing and Gasket: Asbestos free.

2.9 BRONZE GLOBE VALVES

A. Class 125, Bronze Globe Valves with Bronze Disc (Valves must be American Made):

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Crane Co.; Crane Valve Group; Crane Valves.
b. Crane Co.; Crane Valve Group; Stockham Division.
c. Kitz Corporation.
d. Milwaukee Valve Company.
e. NIBCO INC.
f. Powell Valves.
g. Watts Regulator Co.; a division of Watts Water Technologies, Inc.

2. Description:

a. Standard: MSS SP-80, Type 1.

b. CWP Rating: 200 psig.
c. Body Material: ASTM B 62, bronze with integral seat and screw-in bonnet.
d. Ends: Threaded to 2”, Flanged 2” and greater.
e. Stem and Disc: Bronze.
f. Packing: Asbestos free.
g. Handwheel: Malleable iron, bronze, or aluminum.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine valve interior for cleanliness, freedom from foreign matter, and corrosion. Remove special packing materials, such as blocks, used to prevent disc movement during shipping and handling.

B. Operate valves in positions from fully open to fully closed. Examine guides and seats made accessible by such operations.

C. Examine threads on valve and mating pipe for form and cleanliness.

D. Examine mating flange faces for conditions that might cause leakage. Check bolting for proper size, length, and material. Verify that gasket is of proper size, that its material composition is suitable for service, and that it is free from defects and damage.

E. Do not attempt to repair defective valves; replace with new valves.

3.2 VALVE INSTALLATION

A. Install valves with unions or flanges at each piece of equipment arranged to allow service, maintenance, and equipment removal without system shutdown. Locate valves for easy access and provide separate support where necessary.

B. Install valves in horizontal piping with stem at or above center of pipe.

C. Install valves in position to allow full stem movement.

D. Install check valves for proper direction of flow and as follows:

1. Swing Check Valves: In horizontal position with hinge pin level.

E. Install main isolation valves at the main entrance/exit of each building.

F. Install independent isolation valves at each coil/equipment. (These isolation valves are to be independent and in addition to any balance valves.).

G. Install isolation valves at main branch take-offs to allow for branch isolation.

H. Install isolation valves at mechanical room entrance, when connecting more than one coil in the respective mechanical room. (This is to facilitate future renovation/service.)

3.3 ADJUSTING

A. Adjust or replace valve packing after piping systems have been tested and put into service but before final adjusting and balancing. Replace valves if persistent leaking occurs.

3.4 GENERAL REQUIREMENTS FOR VALVE APPLICATIONS

A. If valve applications are not indicated, use the following:

1. Shutoff Service: Ball, butterfly, or gate valves.
2. Butterfly Valve Dead-End Service: Single-flange (lug) type.
3. Throttling Service: Ball, or butterfly valves.

4. Pump-Discharge Check Valves:

a. NPS 2 and Smaller: Bronze swing check valves with bronze disc.
b. NPS 2-1/2 and Larger: Iron swing check valves with lever and weight or with spring or iron, center-guided, metal-seat check valves.

B. If valves with specified SWP classes or CWP ratings are not available, the same types of valves with higher SWP classes or CWP ratings may be substituted.

C. Select valves, except wafer types, with the following end connections:

1. For Copper Tubing, NPS 2 and Smaller: Threaded ends or solder-joint valve-end.
2. For Copper Tubing, NPS 2-1/2 to NPS 4: Flanged ends.
3. For Copper Tubing, NPS 5 and Larger: Flanged ends.
4. For Steel Piping, NPS 2 and Smaller: Threaded ends.
5. For Steel Piping, NPS 2-1/2 to NPS 4: Flanged ends or threaded valve-end.
6. For Steel Piping, NPS 5 and Larger: Flanged ends.

3.5 CHILLED-WATER VALVE SCHEDULE

A. Pipe NPS 2 and Smaller:

1. Ball Valves: Two-piece, full port, bronze with bronze trim.
2. Bronze Gate Valves: Class 125, NRS, bronze.

B. Pipe NPS 2-1/2 and Larger:

1. Iron Ball Valves, NPS 2-1/2 to NPS 10: Class 150.
2. Iron, Single-Flange Butterfly Valves, NPS 2-1/2 to NPS 12: 200 CWP, EPDM seat, aluminum-bronze disc.
3. Iron Swing Check Valves with Closure Control, NPS 2-1/2 to NPS 12: Class 125, lever and spring.

END OF SECTION 23 05 23

SECTION 23 05 29 - HANGERS AND SUPPORTS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following hangers and supports for HVAC system piping and equipment:

1. Steel pipe hangers and supports.
2. Trapeze pipe hangers.
3. Thermal-hanger shield inserts.
4. Fastener systems.
5. Pipe stands.
6. Equipment supports.

B. Related Sections include the following:

1. Division 21 Section "Fire-Suppression Piping" for pipe hangers for fire-protection piping.
2. Division 23 Section "Vibration Controls for HVAC Piping and Equipment" for vibration isolation devices.
3. Division 23 Section(s) "Metal Ducts" for duct hangers and supports.

1.3 DEFINITIONS

A. MSS: Manufacturers Standardization Society for The Valve and Fittings Industry Inc.

B. Terminology: As defined in MSS SP-90, "Guidelines on Terminology for Pipe Hangers and Supports."

1.4 SUBMITTALS

A. Product Data: For the following:

1. Steel pipe hangers and supports.
2. Thermal-hanger shield inserts.

1.5 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel."

B. Welding: Qualify procedures and personnel according to the following:

1. AWS D1.1, "Structural Welding Code--Steel."
2. AWS D1.3, "Structural Welding Code--Sheet Steel."
3. AWS D1.4, "Structural Welding Code--Reinforcing Steel."

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 STEEL PIPE HANGERS AND SUPPORTS

A. Description: MSS SP-58, Types 1 through 58, factory-fabricated components. Refer to Part 3 "Hanger and Support Applications" Article for where to use specific hanger and support types.

B. Manufacturers:

1. AAA Technology & Specialties Co., Inc.
2. B-Line Systems, Inc.; a division of Cooper Industries.
3. Grinnell Corp.
4. National Pipe Hanger Corporation.
5. PHD Manufacturing, Inc.
6. Empire.

C. Galvanized, Metallic Coatings: Pregalvanized or hot dipped.

D. Nonmetallic Coatings: Plastic coating, jacket, or liner.

E. Padded Hangers: Hanger with fiberglass or other pipe insulation pad or cushion for support of bearing surface of piping.

2.3 TRAPEZE PIPE HANGERS

A. Description: MSS SP-69, Type 59, shop- or field-fabricated pipe-support assembly made from structural-steel shapes with MSS SP-58 hanger rods, nuts, saddles, and U-bolts.

2.4 THERMAL-HANGER SHIELD INSERTS

A. Description: 100-psig- minimum, compressive-strength insulation insert encased in sheet metal shield.

B. Manufacturers:

1. Carpenter & Paterson, Inc.
2. PHS Industries, Inc.
3. Pipe Shields, Inc.
4. Rilco Manufacturing Company, Inc.

C. Insulation-Insert Material for Cold Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate with vapor barrier.

D. Insulation-Insert Material for Hot Piping: Water-repellent treated, ASTM C 533, Type I calcium silicate.

E. For Trapeze or Clamped Systems: Insert and shield shall cover entire circumference of pipe.

F. For Clevis or Band Hangers: Insert and shield shall cover lower 180 degrees of pipe.

G. Insert Length: Extend 2 inches beyond sheet metal shield for piping operating below ambient air temperature.

2.5 FASTENER SYSTEMS

A. Mechanical-Expansion Anchors: Insert-wedge-type zinc-coated steel, for use in hardened portland cement concrete with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

1. Manufacturers:

a. B-Line Systems, Inc.; a division of Cooper Industries.
b. Hilti, Inc.
c. MKT Fastening, LLC.
d. Powers Fasteners.

2.6 PIPE STAND FABRICATION

A. Pipe Stands, General: Shop or field-fabricated assemblies made of manufactured corrosion-resistant components to support roof-mounted piping.

B. High-Type, Single-Pipe Stand: Assembly of base, vertical and horizontal members, and pipe support, for roof installation without membrane penetration.

1. Manufacturers:

   a. ERICO/Michigan Hanger Co.
   b. MIRO Industries.
   c. Portable Pipe Hangers.

2. Base: Plastic.
3. Vertical Members: Two or more cadmium-plated-steel or stainless-steel, continuous-thread rods.
4. Horizontal Member: Cadmium-plated-steel or stainless-steel rod with plastic or stainless-steel, roller-type pipe support.

2.7 EQUIPMENT SUPPORTS

A. Description: Welded, shop- or field-fabricated equipment support made from structural-steel shapes.

2.8 MISCELLANEOUS MATERIALS

A. Structural Steel: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

B. Grout: ASTM C 1107, factory-mixed and -packaged, dry, hydraulic-cement, nonshrink and nonmetallic grout; suitable for interior and exterior applications.

1. Properties: Nonstaining, noncorrosive, and nongaseous.
2. Design Mix: 5000-psi, 28-day compressive strength.

PART 3 - EXECUTION

3.1 HANGER AND SUPPORT APPLICATIONS

A. Specific hanger and support requirements are specified in Sections specifying piping systems and equipment. Supports and associated anchors shall be sized for the anticipated loads (dead, live, wind), and coordinated with the building structural requirements.

B. Comply with MSS SP-69 for pipe hanger selections and applications that are not specified in piping system Sections.

C. Use hangers and supports with galvanized, metallic coatings for piping and equipment that will not have field-applied finish.

D. Use nonmetallic coatings on attachments for electrolytic protection where attachments are in direct contact with copper tubing.

E. Use padded hangers for piping that is subject to scratching.

F. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Adjustable, Steel Clevis Hangers (MSS Type 1): For suspension of noninsulated or insulated stationary pipes, NPS 1/2 to NPS 30.

G. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.

H. Hanger-Rod Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Steel Turnbuckles (MSS Type 13): For adjustment up to 6 inches for heavy loads.

I. Building Attachments: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Top-Beam C-Clamps (MSS Type 19): For use under roof installations with bar-joist construction to attach to top flange of structural shape.
2. Side-Beam or Channel Clamps (MSS Type 20): For attaching to bottom flange of beams, channels, or angles.

J. Saddles and Shields: Unless otherwise indicated and except as specified in piping system Sections, install the following types:

1. Protection Shields (MSS Type 40): Of length recommended in writing by manufacturer to prevent crushing insulation.
2. Thermal-Hanger Shield Inserts: For supporting insulated pipe.

K. Comply with MSS SP-69 for trapeze pipe hanger selections and applications that are not specified in piping system Sections.

L. Use powder-actuated fasteners or mechanical-expansion anchors instead of building attachments where required in concrete construction.

3.2 HANGER AND SUPPORT INSTALLATION

A. Steel Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Install hangers, supports, clamps, and attachments as required to properly support piping from building structure.

B. Trapeze Pipe Hanger Installation: Comply with MSS SP-69 and MSS SP-89. Arrange for grouping of parallel runs of horizontal piping and support together on field-fabricated trapeze pipe hangers.

1. Pipes of Various Sizes: Support together and space trapezes for smallest pipe size or install intermediate supports for smaller diameter pipes as specified above for individual pipe hangers.
2. Field fabricate from ASTM A 36/A 36M, steel shapes selected for loads being supported. Weld steel according to AWS D1.1.

C. Thermal-Hanger Shield Installation: Install in pipe hanger or shield for insulated piping.

D. Fastener System Installation:

1. Install mechanical-expansion anchors in concrete after concrete is placed and completely cured. Install fasteners according to manufacturer's written instructions.

E. Pipe Stand Installation:

1. Pipe Stand Types except Curb-Mounting Type: Assemble components and mount on smooth roof surface. Do not penetrate roof membrane.
2. Curb-Mounting-Type Pipe Stands: Assemble components or fabricate pipe stand and mount on permanent, stationary roof curb. Refer to Division 7 Section "Roof Accessories" for curbs.

F. Install hangers and supports complete with necessary inserts, bolts, rods, nuts, washers, and other accessories.

G. Equipment Support Installation: Fabricate from welded-structural-steel shapes.

H. Install hangers and supports to allow controlled thermal and seismic movement of piping systems, to permit freedom of movement between pipe anchors, and to facilitate action of expansion joints, expansion loops, expansion bends, and similar units.

I. Install lateral bracing with pipe hangers and supports to prevent swaying.

J. Install building attachments within concrete slabs or attach to structural steel. Install additional attachments at concentrated loads, including valves, flanges, and strainers, NPS 2-1/2 and larger and at changes in direction of piping. Install concrete inserts before concrete is placed; fasten inserts to forms and install reinforcing bars through openings at top of inserts.

K. Load Distribution: Install hangers and supports so piping live and dead loads and stresses from movement will not be transmitted to connected equipment.

L. Pipe Slopes: Install hangers and supports to provide indicated pipe slopes and so maximum pipe deflections allowed by ASME B31.1 (for power piping) and ASME B31.9 (for building services piping) are not exceeded.

M. Insulated Piping: Comply with the following:

1. Attach clamps and spacers to piping.

   a. Piping Operating above Ambient Air Temperature: Clamp may project through insulation.
   b. Piping Operating below Ambient Air Temperature: Use thermal-hanger shield insert with clamp sized to match OD of insert.
   c. Do not exceed pipe stress limits according to ASME B31.1 for power piping and ASME B31.9 for building services piping.

2. Install MSS SP-58, Type 39, protection saddles if insulation without vapor barrier is indicated. Fill interior voids with insulation that matches adjoining insulation.

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

3. Install MSS SP-58, Type 40, protective shields on cold piping with vapor barrier. Shields shall span an arc of 180 degrees.

   a. Option: Thermal-hanger shield inserts may be used. Include steel weight-distribution plate for pipe NPS 4 and larger if pipe is installed on rollers.

4. Shield Dimensions for Pipe: Not less than the following:

   a. NPS 1/4 to NPS 3-1/2: 12 inches long and 0.048 inch thick.
   b. NPS 4: 12 inches long and 0.06 inch thick.
   c. NPS 5 and NPS 6: 18 inches long and 0.06 inch thick.

5. Insert Material: Length at least as long as protective shield.
6. Thermal-Hanger Shields: Install with insulation same thickness as piping insulation.

3.3 EQUIPMENT SUPPORTS

A. Fabricate structural-steel stands to suspend equipment from structure overhead or to support equipment above floor.

B. Grouting: Place grout under supports for equipment and make smooth bearing surface.

C. Provide lateral bracing, to prevent swaying, for equipment supports.

3.4 METAL FABRICATIONS

A. Cut, drill, and fit miscellaneous metal fabrications for trapeze pipe hangers and equipment supports.

B. Fit exposed connections together to form hairline joints. Field weld connections that cannot be shop welded because of shipping size limitations.

C. Field Welding: Comply with AWS D1.1 procedures for shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work, and with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
2. Obtain fusion without undercut or overlap.
3. Remove welding flux immediately.
4. Finish welds at exposed connections so no roughness shows after finishing and contours of welded surfaces match adjacent contours.

3.5 ADJUSTING

A. Hanger Adjustments: Adjust hangers to distribute loads equally on attachments and to achieve indicated slope of pipe.

B. Trim excess length of continuous-thread hanger and support rods to 1-1/2 inches.

3.6 PAINTING

A. Touch Up: Clean field welds and abraded areas of shop paint. Paint exposed areas immediately after erecting hangers and supports. Use same materials as used for shop painting. Comply with SSPC-PA 1 requirements for touching up field-painted surfaces.

1. Apply paint by brush or spray to provide minimum dry film thickness of 2.0 mils.

B. Touch Up: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint on miscellaneous metal are specified in Division 9 painting Sections.

C. Galvanized Surfaces: Clean welds, bolted connections, and abraded areas and apply galvanizing-repair paint to comply with ASTM A 780.

END OF SECTION 230529

SECTION 23 05 48 - VIBRATION CONTROLS FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Isolation pads.
2. Isolation mounts.
3. Spring isolators.
4. Duct silencers.
5. Acoustic housings.
6. Ductwork lagging.

1.3 DEFINITIONS

A. ICC-ES: ICC-Evaluation Service.

B. OSHPD: Office of Statewide Health Planning and Development for the State of California.

1.4 REFERENCES

A. Air Movement and Control Association International, Inc.:

1. AMCA 300 - Reverberant Room Method for Sound Testing of Fans.

B. American National Standards Institute:

1. ANSI S1.4 - Sound Level Meters.
2. ANSI S1.8 - Reference Quantities for Acoustical Levels.
3. ANSI S1.13 - Methods for the Measurement of Sound Pressure Levels in Air.
4. ANSI S12.36 - Survey Methods for the Determination of Sound Power Levels of Noise Sources.

C. Air-Conditioning and Refrigeration Institute:

1. ARI 575 - Method of Measuring Machinery Sound within Equipment Space.

D. American Society of Heating, Refrigerating and Air-Conditioning Engineers:

1. ASHRAE 68 - Laboratory Method of Testing In-Duct Sound Power Measurement Procedure for Fans.
2. ASHRAE Handbook - 2007 HVAC Applications Chapter 47.

E. ASTM International:

1. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements.
2. ASTM E477 - Standard Test Method for Measuring Acoustical and Airflow Performance of Duct Liner Materials and Prefabricated Silencers.
3. ASTM E596 - Standard Test Method for Laboratory Measurement of the Noise Reduction of Sound-Isolating Enclosures.

F. Sheet Metal and Air Conditioning Contractors' National Association:

1. SMACNA - HVAC Duct Construction Standard - Metal and Flexible.
2. SMACNA - Restraint Manual: Guidelines for Mechanical Systems.

1.5 PERFORMANCE REQUIREMENTS

A. Wind-Restraint Loading:

1. Basic Wind Speed: 110 mph.
2. Building Classification Category: I.
3. Minimum 10 lb/sq. ft. multiplied by the maximum area of the HVAC component projected on a vertical plane that is normal to the wind direction, and 45 degrees either side of normal.

1.6 SUBMITTALS

A. Product Data: For the following:

1. Include rated load, rated deflection, and overload capacity for each vibration isolation device.
2. Interlocking Snubbers: Include ratings for horizontal, vertical, and combined loads.
3. Acoustical Silencers.

B. Delegated-Design Submittal: For vibration isolation and wind restraint details indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1. Design Calculations: Calculate static and dynamic loading due to equipment weight and operation, wind forces required to select vibration isolators, wind restraints, and for designing vibration isolation bases.

    a. Coordinate design calculations with wind load calculations required for equipment mounted outdoors. Comply with requirements in other Division 23 Sections for equipment mounted outdoors.

C. If the standard sizes of silencers offered by the silencer manufacturer or vendor do not provide attenuation equal to or greater than the specified insertion loss in each octave band 1 through 6, then at the time of bidding the manufacturer/vendor making the submission shall note all such discrepancies and provide alternative proposals and pricing to make up the discrepancies. The controlling requirements are the insertion loss, pressure drop and self-noise.

D. Welding certificates.

E. Sheet Metal: Coordinated shop drawings shall be submitted for review and approval to indicate the following:

1. Length, width, height, and elevation of bottom of each duct segment.
2. Sheet metal gauge
3. Location of duct silencers, fire dampers, and balancing dampers.

F. Air moving devices for classrooms (AHU's): Submit sound power levels in octave bands from 63 Hz through 8000 Hz inclusive for the operating conditions specified. Data shall be obtained in accordance with AMCA 300-85. If fans are variable speed, provide sound power level data for maximum rpm and also at 80% and 60% of maximum rpm. Provide discharge, inlet and case-radiated sound power data for all fans.

1. Submit for each fan a performance curve showing the operating point for which the acoustical data has been provided.

G. Silencers: Submit test data from an independent laboratory showing the insertion loss and air-flow-regenerated noise of the specified silencers in octave bands from 63 Hz to 8000 Hz, measured in accordance with ASTM E477-73. Pressure drop ratings shall be measured for the same silencer tested for acoustical performance; the data shall be submitted with the acoustical performance data. The insertion loss of the silencers shall be measured and reported in octave band or 1/3 octave bands.

1.7 QUALITY ASSURANCE

A. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Wind Restraint devices shall comply with the wind rating as specified within this section. Restraint devices shall be suitable for the specific application and have a Florida structural engineering seal for compliance.

PART 2 - PRODUCTS

2.1 VIBRATION ISOLATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Amber/Booth Company, Inc.
2. Kinetics Noise Control.
3. Mason Industries.

B. Pads: Arranged in single or multiple layers of sufficient stiffness for uniform loading over pad area, molded with a nonslip pattern and galvanized-steel baseplates, and factory cut to sizes that match requirements of supported equipment.

1. Resilient Material: Oil- and water-resistant neoprene.

C. Mounts: Double-deflection type, with molded, oil-resistant rubber, hermetically sealed compressed fiberglass, or neoprene isolator elements with factory-drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure. Color-code or otherwise identify to indicate capacity range.

1. Materials: Cast-ductile-iron or welded steel housing containing two separate and opposing, oil-resistant rubber or neoprene elements that prevent central threaded element and attachment hardware from contacting the housing during normal operation.
2. Neoprene: Shock-absorbing materials compounded according to the standard for bridge-bearing neoprene as defined by AASHTO.

D. Spring Hangers with Vertical-Limit Stop: Combination coil-spring and elastomeric-insert hanger with spring and insert in compression and with a vertical-limit stop.

1. Frame: Steel, fabricated for connection to threaded hanger rods and to allow for a maximum of 30 degrees of angular hanger-rod misalignment without binding or reducing isolation efficiency.
2. Outside Spring Diameter: Not less than 80 percent of the compressed height of the spring at rated load.
3. Minimum Additional Travel: 50 percent of the required deflection at rated load.
4. Lateral Stiffness: More than 80 percent of rated vertical stiffness.
5. Overload Capacity: Support 200 percent of rated load, fully compressed, without deformation or failure.
6. Elastomeric Element: Molded, oil-resistant rubber or neoprene.

7. Adjustable Vertical Stop: Steel washer with neoprene washer "up-stop" on lower threaded rod.
8. Self-centering hanger rod cap to ensure concentricity between hanger rod and support spring coil.

2.2 FACTORY FINISHES

A. Finish: Manufacturer's standard paint applied to factory-assembled and -tested equipment before shipping.

1. Powder coating on springs and housings.
2. All hardware shall be galvanized. Hot-dip galvanize metal components for exterior use.
3. Baked enamel or powder coat for metal components on isolators for interior use.
4. Color-code or otherwise mark vibration isolation and wind-control devices to indicate capacity range.

2.3 DUCT SILENCERS

A. All prefabricated duct silencers shall be furnished by a single manufacturer with a minimum five years experience. The following manufacturers are pre-approved based on the quality of their products. The Acoustics Consultant and Architect must approve any alternates. All provided equipment must be in compliance with the specified design and performance requirements:

1. Industrial Acoustics Company, Bronx, New York
2. Vibro-Acoustics, Scarborough, Ontario
3. AeroAcoustic Corporation, Roselle, New Jersey
4. Pre-Approved Alternate Manufacturer Prior to Bid.

B. Rectangular duct silencers shall have outer casings of not less than 22-gauge galvanized steel. Seams shall be lock formed and mastic filled. The internal baffles (splitters) shall be not less than 24-gauge galvanized perforated steel having an open area of about 30%. The nosings shall be full radius or airfoil shape.

C. The sound absorbing media shall be not less than 4.5 pcf glass/mineral fiber packed under 5% compression. The fiber fill shall be incombustible, mildew resistant and vermin proof. The sound absorbing material shall be protected from erosion.

D. If the silencer is supplied in modular sections, the silencer shall meet or exceed the specification for single-module silencers with respect to insertion loss, pressure drop, regenerated noise and air leakage.

E. Rating:

1. ASTM E477 Minimum Required Insertion Loss and Maximum Allowable Generated Noise at 1000 fpm (7 m/sec). See schedules on Drawings.

2. Static Pressure Drop: see schedules on Drawings.
3. Air Tight Static Pressure: 10 inches wg (2.5 kPa).

F. Performance: Achieve insertion loss self generated noise, and static pressure drop for cfm flow required per schedules on Drawings.

2.4 DUCTWORK LAGGING

A. Acoustic Insulation: 2 inch thick, 3 to 5 lb/cu ft density glass fiber or mineral wool insulation.

B. Covering: Sheet lead with surface weight minimum 4 lb/sq ft.

C. Provide Duct lagging from sound attenuator location within mechanical room to mechanical room wall to prevent break-in noise.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and equipment to receive vibration isolation and wind-control devices for compliance with requirements for installation tolerances and other conditions affecting performance.

B. Examine roughing-in of reinforcement and cast-in-place anchors to verify actual locations before installation.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLICATIONS

A. Multiple Pipe Supports: Secure pipes to trapeze member with clamps approved for application by an evaluation service member of ICC-ES.

B. Strength of Support and Seismic-Restraint Assemblies: Where not indicated, select sizes of components so strength will be adequate to carry present and future static and seismic loads within specified loading limits.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. Provide evidence of recent calibration of test equipment by a testing agency acceptable to authorities having jurisdiction.
2. Schedule test with Owner, through Architect, before connecting anchorage device to restrained component (unless postconnection testing has been approved), and with at least seven days' advance notice.
3. Obtain Architect's approval before transmitting test loads to structure. Provide temporary load-spreading members.
4. Test at least four of each type and size of installed anchors and fasteners selected by Architect.
5. Test to 90 percent of rated proof load of device.
6. Measure isolator restraint clearance.
7. Measure isolator deflection.
8. Verify snubber minimum clearances.
9. If a device fails test, modify all installations of same type and retest until satisfactory results are achieved.

C. Remove and replace malfunctioning units and retest as specified above.

D. Prepare test and inspection reports.

3.4 ADJUSTING

A. Adjust isolators after piping system is at operating weight.

B. Adjust limit stops on restrained spring isolators to mount equipment at normal operating height. After equipment installation is complete, adjust limit stops so they are out of contact during normal operation.

C. Adjust active height of spring isolators.

D. Adjust restraints to permit free movement of equipment within normal mode of operation.

3.5 HVAC VIBRATION-CONTROL RESTRAINT DEVICE SCHEDULE

A. Supported or Suspended Equipment:

1. Air Handling Unit Vibration Pads:

   a. Material: Neoprene.
   b. Thickness: 3/4 inches.
   c. Provide Full sheet of Neoprene Under Base Rail of Units.

END OF SECTION 23 05 48

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SECTION 23 05 53 - IDENTIFICATION FOR HVAC PIPING AND EQUIPMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Equipment labels.
2. Warning signs and labels.
3. Pipe labels.
4. Duct labels.
5. Stencils.
6. Valve tags.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Valve numbering scheme.

1.4 COORDINATION

A. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

B. Coordinate installation of identifying devices with locations of access panels and doors.

C. Install identifying devices before installing acoustical ceilings and similar concealment.

PART 2 - PRODUCTS

2.1 EQUIPMENT LABELS

A. Metal Labels for Equipment:

1. Material and Thickness: Aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.
3. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.
4. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

B. Label Content: Include equipment's Drawing designation or unique equipment number, Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified.

C. Equipment Label Schedule: For each item of equipment to be labeled, on 8-1/2-by-11-inch bond paper. Tabulate equipment identification number and identify Drawing numbers where equipment is indicated (plans, details, and schedules), plus the Specification Section number and title where equipment is specified. Equipment schedule shall be included in operation and maintenance data.

2.2 CEILING GRID TAGS FOR EQUIPMENT LOCATED ABOVE HARD OR LAY-IN CEILING

A. Description: 3/4” x 3” vinyl label, 3.0 Mil self adhesive vinyl similar to DuraLabel Pro. Label color shall be black text on a white background. The label shall contain the following information:

1. Equipment name: Per Scheduled Equipment Naming convention.

B. All scheduled equipment above finish hard or lay-in ceiling shall be identified with an Equipment Tag.

2.3 WARNING SIGNS AND LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: Red.

C. Background Color: White.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Fasteners: Stainless-steel rivets.

H. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

I. Label Content: Include caution and warning information, plus emergency notification instructions.

2.4 PIPE LABELS

A. General Requirements for Manufactured Pipe Labels: Preprinted, color-coded, with lettering indicating service, and showing flow direction.

B. Pretensioned Pipe Labels: Precoiled, semirigid plastic formed to cover full circumference of pipe and to attach to pipe without fasteners or adhesive.

C. Pipe Label Contents: Include identification of piping service using same designations or abbreviations as used on Drawings, pipe size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with piping system service lettering to accommodate both directions or as separate unit on each pipe label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches.

2.5 DUCT LABELS

A. Material and Thickness: Multilayer, multicolor, plastic labels for mechanical engraving, 1/8 inch thick, and having predrilled holes for attachment hardware.

B. Letter Color: Black.

C. Background Color: White.

D. Maximum Temperature: Able to withstand temperatures up to 160 deg F.

E. Minimum Label Size: Length and width vary for required label content, but not less than 2-1/2 by 3/4 inch.

F. Minimum Letter Size: 1/4 inch for name of units if viewing distance is less than 24 inches, 1/2 inch for viewing distances up to 72 inches, and proportionately larger lettering for greater viewing distances. Include secondary lettering two-thirds to three-fourths the size of principal lettering.

G. Adhesive: Contact-type permanent adhesive, compatible with label and with substrate.

H. Duct Label Contents: Include identification of duct service using same designations or abbreviations as used on Drawings, duct size, and an arrow indicating flow direction.

1. Flow-Direction Arrows: Integral with duct system service lettering to accommodate both directions, or as separate unit on each duct label to indicate flow direction.
2. Lettering Size: At least 1-1/2 inches.

2.6 VALVE TAGS

A. Valve Tags: Stamped or engraved with 1/4-inch letters for piping system abbreviation and 1/2-inch numbers.

1. Tag Material: Aluminum, 0.032-inch minimum thickness, and having predrilled or stamped holes for attachment hardware.
2. Fasteners: Brass wire-link or beaded chain; or S-hook.

B. Valve Schedules: For each piping system, on 8-1/2-by-11-inch bond paper. Tabulate valve number, piping system, system abbreviation (as shown on valve tag), location of valve (room or space), normal-operating position (open, closed, or modulating), and variations for identification. Mark valves for emergency shutoff and similar special uses.

1. Valve-tag schedule shall be included in operation and maintenance data.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean piping and equipment surfaces of substances that could impair bond of identification devices, including dirt, oil, grease, release agents, and incompatible primers, paints, and encapsulants.

3.2 EQUIPMENT LABEL INSTALLATION

A. Install or permanently fasten labels on each major item of mechanical equipment.

B. Locate equipment labels where accessible and visible.

C. All mechanical equipment, located above the ceiling and requiring maintenance or accessibility, shall be labeled on the ceiling or ceiling grid, directly below the indicated equipment.

1. Provide ceiling grid tags to locate scheduled equipment above T-bar type panel ceilings. Locate in corner of grid closest to equipment.
2. Provide ceiling tags to locate scheduled equipment above access panels in hard ceilings. Locate in corner of access panel closest to equipment.

3.3 PIPE LABEL INSTALLATION

A. Piping Color-Coding: Painting of piping is specified in Division 9 Section "Interior Painting."

B. Locate pipe labels where piping is exposed or above accessible ceilings in finished spaces; machine rooms; accessible maintenance spaces such as shafts, tunnels, and plenums; and exterior exposed locations as follows:

1. Near each valve and control device.
2. Near each branch connection, excluding short takeoffs for fixtures and terminal units. Where flow pattern is not obvious, mark each pipe at branch.
3. Near penetrations through walls, floors, ceilings, and inaccessible enclosures.
4. At access doors, manholes, and similar access points that permit view of concealed piping.
5. Near major equipment items and other points of origination and termination.
6. Spaced at maximum intervals of 50 feet along each run. Reduce intervals to 25 feet in areas of congested piping and equipment.
7. On piping above removable acoustical ceilings. Omit intermediately spaced labels.

C. Pipe Label Color Schedule:

1. Chilled-Water Piping:

   a. Background Color: White.
   b. Letter Color: Blue.

2. Refrigerant Piping:

   a. Background Color: Black.
   b. Letter Color: White.

3.4 DUCT LABEL INSTALLATION

A. Install plastic-laminated duct labels with permanent adhesive on air ducts in the following color codes:

1. Blue: For cold-air supply ducts.
2. Yellow: For hot-air supply ducts.
3. Green: For exhaust-, outside-, relief-, return-, and mixed-air ducts.

B. Locate labels near points where ducts enter into concealed spaces and at maximum intervals of 50 feet in each space where ducts are exposed or concealed by removable ceiling system.

3.5 VALVE-TAG INSTALLATION

A. Install tags on valves and control devices in piping systems, except check valves; valves within factory-fabricated equipment units; shutoff valves; faucets; convenience and lawn-watering hose connections; and HVAC terminal devices and similar roughing-in connections of end-use fixtures and units. List tagged valves in a valve schedule.

B. Valve-Tag Application Schedule: Tag valves according to size, shape, and color scheme and with captions similar to those indicated in the following subparagraphs:

1. Valve-Tag Size and Shape:

   a. Chilled Water: 2 inches, square.

2. Valve-Tag Color:

   a. Chilled Water: Natural.

3. Letter Color:

   a. Chilled Water: Black.

END OF SECTION 23 05 53

SECTION 23 05 93 - TESTING, ADJUSTING, AND BALANCING FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Balancing Air Systems:

   a. Constant-volume Dehumidification air systems.
   b. Variable-air-volume systems.
   c. General exhaust systems.
   d. Chilled Beam Air systems.
   e. Plate & Frame Heat Exchangers

2. Balancing Hydronic Piping Systems:

   a. Variable-flow hydronic systems.

      1) Systems installed with pressure independent control valves shall not require hydronic system balancing. Flow shall be verified and adjusted for the pressure independent valve assembly for field conditions using the pressure independent control valve manufacturer’s documented procedure for 25% of the total installed product. Exact locations of tested product to be coordinated with the commissioning agent.

1.3 DEFINITIONS

A. AABC: Associated Air Balance Council.

B. NEBB: National Environmental Balancing Bureau.

C. TAB: Testing, adjusting, and balancing.

D. TABB: Testing, Adjusting, and Balancing Bureau.

E. TAB Specialist: An entity engaged to perform TAB Work.

1.4 SUBMITTALS

A. Qualification Data: Within 30 days of Contractor's Notice to Proceed, submit documentation that the TAB contractor and this Project's TAB team members meet the qualifications specified in "Quality Assurance" Article.

B. Contract Documents Examination Report: Within 30 days of Contractor's Notice to Proceed, submit the Contract Documents review report as specified in Part 3.

C. Strategies and Procedures Plan: Within 60 days of Contractor's Notice to Proceed, submit TAB strategies and step-by-step procedures as specified in "Preparation" Article.

D. Certified TAB reports.

E. Sample report forms.

F. Instrument calibration reports, to include the following:

1. Instrument type and make.
2. Serial number.
3. Application.
4. Dates of use.
5. Dates of calibration.

1.5 QUALITY ASSURANCE

A. TAB Contractor Qualifications: Engage a TAB entity certified by AABC, NEBB or TABB.

1. TAB Field Supervisor: Employee of the TAB contractor and certified by AABC, NEBB or TABB.
2. TAB Technician: Employee of the TAB contractor and who is certified by AABC, NEBB or TABB as a TAB technician.

B. TAB Conference: Meet with Architect, Owner Representative, General Contractor, Engineer and Commissioning Authority on approval of the TAB strategies and procedures plan to develop a mutual understanding of the details. Require the participation of the TAB field supervisor and technicians. Provide seven days' advance notice of scheduled meeting time and location.

1. Agenda Items:

a. The Contract Documents examination report.

b. The TAB plan.
c. Coordination and cooperation of trades and subcontractors.
d. Coordination of documentation and communication flow.

C. Certify TAB field data reports and perform the following:

1. Review field data reports to validate accuracy of data and to prepare certified TAB reports.
2. Certify that the TAB team complied with the approved TAB plan and the procedures specified and referenced in this Specification.

D. TAB Report Forms: Use standard TAB contractor's forms approved by Commissioning Authority.

E. Instrumentation Type, Quantity, Accuracy, and Calibration: As described in ASHRAE 111, Section 5, "Instrumentation."

1.6 PROJECT CONDITIONS

A. Full Owner Occupancy: Owner will occupy the site and existing building during entire TAB period. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

B. Partial Owner Occupancy: Owner may occupy completed areas of building before Substantial Completion. Cooperate with Owner during TAB operations to minimize conflicts with Owner's operations.

1.7 COORDINATION

A. Notice: Provide seven days' advance notice for each test. Include scheduled test dates and times.

B. Perform TAB after leakage and pressure tests on air and water distribution systems have been satisfactorily completed.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine the Contract Documents to become familiar with Project requirements and to discover conditions in systems' designs that may preclude proper TAB of systems and equipment.

B. Examine systems for installed balancing devices, such as test ports, gage cocks, thermometer wells, flow-control devices, balancing valves and fittings, and manual volume dampers. Verify that locations of these balancing devices are accessible.

C. Examine the approved submittals for HVAC systems and equipment.

D. Examine design data including HVAC system descriptions, statements of design assumptions for environmental conditions and systems' output, and statements of philosophies and assumptions about HVAC system and equipment controls.

E. Examine ceiling plenums and underfloor air plenums used for supply, return, or relief air to verify that they meet the leakage class of connected ducts as specified in Division 23 Section "Metal Ducts" and are properly separated from adjacent areas. Verify that penetrations in plenum walls are sealed and fire-stopped if required.

F. Examine equipment performance data including fan and pump curves.

1. Relate performance data to Project conditions and requirements, including system effects that can create undesired or unpredicted conditions that cause reduced capacities in all or part of a system.
2. Calculate system-effect factors to reduce performance ratings of HVAC equipment when installed under conditions different from the conditions used to rate equipment performance. To calculate system effects for air systems, use tables and charts found in AMCA 201, "Fans and Systems," or in SMACNA's "HVAC Systems - Duct Design." Compare results with the design data and installed conditions.

G. Examine system and equipment installations and verify that field quality-control testing, cleaning, and adjusting specified in individual Sections have been performed.

H. Examine test reports specified in individual system and equipment Sections.

I. Examine HVAC equipment and filters and verify that bearings are greased, belts are aligned and tight, and equipment with functioning controls is ready for operation.

J. Examine terminal units, such as variable-air-volume boxes, and verify that they are accessible and their controls are connected and functioning.

K. Examine strainers. Verify that startup screens are replaced by permanent screens with indicated perforations.

L. Examine heat-transfer coils for correct piping connections and for clean and straight fins.

M. Examine system pumps to ensure absence of entrained air in the suction piping.

N. Examine operating safety interlocks and controls on HVAC equipment.

O. Report deficiencies discovered before and during performance of TAB procedures. Observe and record system reactions to changes in conditions. Record default set points if different from indicated values.

3.2 PREPARATION

A. Prepare a TAB plan that includes strategies and step-by-step procedures.

B. Complete system-readiness checks and prepare reports. Verify the following:

1. Permanent electrical-power wiring is complete.
2. Hydronic systems are filled, clean, and free of air.
3. Automatic temperature-control systems are operational.
4. Equipment and duct access doors are securely closed.
5. Isolating and balancing valves are open and control valves are operational.
6. Ceilings are installed in critical areas where air-pattern adjustments are required and access to balancing devices is provided.
7. Windows and doors can be closed so indicated conditions for system operations can be met.

3.3 GENERAL PROCEDURES FOR TESTING AND BALANCING

A. Perform testing and balancing procedures on each system according to the procedures contained in AABC's "National Standards for Total System Balance", ASHRAE 111, NEBB's "Procedural Standards for Testing, Adjusting, and Balancing of Environmental Systems", and SMACNA's "HVAC Systems - Testing, Adjusting, and Balancing" and in this Section.

1. Comply with requirements in ASHRAE 62.1-2004, Section 7.2.2, "Air Balancing."

B. Cut insulation, ducts, pipes, and equipment cabinets for installation of test probes to the minimum extent necessary for TAB procedures.

1. After testing and balancing, patch probe holes in ducts with same material and thickness as used to construct ducts.
2. After testing and balancing, install test ports and duct access doors that comply with requirements in Division 23 Section "Air Duct Accessories."
3. Install and join new insulation that matches removed materials. Restore insulation, coverings, vapor barrier, and finish according to Division 23 Section "HVAC Insulation."

C. Mark equipment and balancing devices, including damper-control positions, valve position indicators, fan-speed-control levers, and similar controls and devices, with paint or other suitable, permanent identification material to show final settings.

D. Take and report testing and balancing measurements in inch-pound (IP) units.

E. The project's DDC system shall be completed and confirmed in writing by the responsible contractor prior to final TAB activities taking place. The intent is to allow the TAB contractor to verify system operation in its final configuration and minimize inconsistencies introduced by changes to the DDC system.

3.4 GENERAL PROCEDURES FOR BALANCING AIR SYSTEMS

A. Prepare test reports for both fans and outlets. Obtain manufacturer's outlet factors and recommended testing procedures. Crosscheck the summation of required outlet volumes with required fan volumes.

B. Prepare schematic diagrams of systems' "as-built" duct layouts.

C. For variable-air-volume systems, develop a plan to simulate diversity.

D. Determine the best locations in main and branch ducts for accurate duct-airflow measurements.

E. Check airflow patterns from the outdoor-air louvers and dampers and the return- and exhaust-air dampers through the supply-fan discharge and mixing dampers.

F. Locate start-stop and disconnect switches, electrical interlocks, and motor starters.

G. Verify that motor starters are equipped with properly sized thermal protection.

H. Check dampers for proper position to achieve desired airflow path.

I. Check for airflow blockages.

J. Check condensate drains for proper connections and functioning.

K. Check for proper sealing of air-handling-unit components.

L. Verify that air duct system is sealed as specified in Division 23 Section "Metal Ducts.".

1. Prior to the ductwork being leak and pressure tested, the TAB contractor shall sign off that devices are installed that are needed to properly test and balance the system.

3.5 PROCEDURES FOR CONSTANT-VOLUME AIR SYSTEMS

A. Adjust fans to deliver total indicated airflows within the maximum allowable fan speed listed by fan manufacturer.

1. Measure total airflow.

   a. Where sufficient space in ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow.

2. Measure fan static pressures as follows to determine actual static pressure:

   a. Measure outlet static pressure as far downstream from the fan as practical and upstream from restrictions in ducts such as elbows and transitions.
   b. Measure static pressure directly at the fan outlet or through the flexible connection.
   c. Measure inlet static pressure of single-inlet fans in the inlet duct as near the fan as possible, upstream from the flexible connection, and downstream from duct restrictions.
   d. Measure inlet static pressure of double-inlet fans through the wall of the plenum that houses the fan.

3. Measure static pressure across each component that makes up an air-handling unit, rooftop unit, and other air-handling and -treating equipment.

   a. Report the cleanliness status of filters and the time static pressures are measured.

4. Measure static pressures entering and leaving other devices, such as sound traps, heat-recovery equipment, and air washers, under final balanced conditions.
5. Review Record Documents to determine variations in design static pressures versus actual static pressures. Calculate actual system-effect factors. Recommend adjustments to accommodate actual conditions.
6. Obtain approval from Engineer and Commissioning Authority for adjustment of fan speed higher or lower than indicated speed. Comply with requirements in Division 23 Sections for air-handling units for adjustment of fans, belts, and pulley sizes to achieve indicated air-handling-unit performance.
7. Do not make fan-speed adjustments that result in motor overload. Consult equipment manufacturers about fan-speed safety factors. Modulate dampers and measure fan-motor amperage to ensure that no overload will occur. Measure amperage in full-cooling, full-heating, economizer, and any other operating mode to determine the maximum required brake horsepower.

B. Adjust volume dampers for main duct, submain ducts, and major branch ducts to indicated airflows within specified tolerances.

1. Measure airflow of submain and branch ducts.

a. Where sufficient space in submain and branch ducts is unavailable for Pitot-tube traverse measurements, measure airflow at terminal outlets and inlets and calculate the total airflow for that zone.

2. Measure static pressure at a point downstream from the balancing damper, and adjust volume dampers until the proper static pressure is achieved.
3. Remeasure each submain and branch duct after all have been adjusted. Continue to adjust submain and branch ducts to indicated airflows within specified tolerances.

C. Measure air outlets and inlets without making adjustments.

1. Measure terminal outlets using a direct-reading hood or outlet manufacturer's written instructions and calculating factors.

D. Adjust air outlets and inlets for each space to indicated airflows within specified tolerances of indicated values. Make adjustments using branch volume dampers rather than extractors and the dampers at air terminals.

1. Adjust each outlet in same room or space to within specified tolerances of indicated quantities without generating noise levels above the limitations prescribed by the Contract Documents.
2. Adjust patterns of adjustable outlets for proper distribution without drafts.

3.6 PROCEDURES FOR VARIABLE-AIR-VOLUME SYSTEMS

A. Compensating for Diversity: When the total airflow of all terminal units is more than the indicated airflow of the fan, place a selected number of terminal units at a minimum set-point airflow with the remainder at maximum-airflow condition until the total airflow of the terminal units equals the indicated airflow of the fan. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.

B. Pressure-Independent, Variable-Air-Volume Systems: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

1. Set outdoor-air dampers at minimum, and set return- and exhaust-air dampers at a position that simulates full-cooling load.
2. Select the terminal unit that is most critical to the supply-fan airflow and static pressure. Measure static pressure. Adjust system static pressure so the entering static pressure for the critical terminal unit is not less than the sum of the terminal-unit manufacturer's recommended minimum inlet static pressure plus the static pressure needed to overcome terminal-unit discharge system losses.
3. Measure total system airflow. Adjust to within indicated airflow.
4. Set terminal units at maximum airflow and adjust controller or regulator to deliver the designed maximum airflow. Use terminal-unit manufacturer's written instructions to make this adjustment. When total airflow is correct, balance the

air outlets downstream from terminal units the same as described for constant-volume air systems.

5. Set terminal units at minimum airflow and adjust controller or regulator to deliver the designed minimum airflow. Check air outlets for a proportional reduction in airflow the same as described for constant-volume air systems.

    a. If air outlets are out of balance at minimum airflow, report the condition but leave outlets balanced for maximum airflow.

6. Remeasure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow.

    a. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.

7. Measure static pressure at the most critical terminal unit and adjust the static-pressure controller at the main supply-air sensing station to ensure that adequate static pressure is maintained at the most critical unit.
8. Record final fan-performance data.

C. Pressure-Dependent, Variable-Air-Volume Systems with Diversity: After the fan systems have been adjusted, adjust the variable-air-volume systems as follows:

1. Set system at maximum indicated airflow by setting the required number of terminal units at minimum airflow. Select the reduced-airflow terminal units so they are distributed evenly among the branch ducts.
2. Adjust supply fan to maximum indicated airflow with the variable-airflow controller set at maximum airflow.
3. Set terminal units at full-airflow condition.
4. Adjust terminal units starting at the supply-fan end of the system and continuing progressively to the end of the system. Adjust inlet dampers of each terminal unit to indicated airflow. When total airflow is correct, balance the air outlets downstream from terminal units the same as described for constant-volume air systems.
5. Adjust terminal units for minimum airflow.
6. Measure static pressure at the sensor.
7. Measure the return airflow to the fan while operating at maximum return airflow and minimum outdoor airflow. Adjust the fan and balance the return-air ducts and inlets the same as described for constant-volume air systems.

3.7 GENERAL PROCEDURES FOR HYDRONIC SYSTEMS

A. Prepare test reports with pertinent design data, and number in sequence starting at pump to end of system. Check the sum of branch-circuit flows against the approved pump flow rate. Correct variations that exceed plus or minus 5 percent.

B. Prepare schematic diagrams of systems' "as-built" piping layouts.

C. Prepare hydronic systems for testing and balancing according to the following, in addition to the general preparation procedures specified above:

1. Open all manual valves for maximum flow.
2. Check flow-control valves for specified sequence of operation, and set at indicated flow.
3. Set differential-pressure control valves at the specified differential pressure. Do not set at fully closed position when pump is positive-displacement type unless several terminal valves are kept open.
4. Set system controls so automatic valves are wide open to district loop.
5. Check pump-motor load. If motor is overloaded, throttle main flow-balancing device so motor nameplate rating is not exceeded.
6. Check air vents for a forceful liquid flow exiting from vents when manually operated.

D. Before the piping is flushed and cleaned, the TAB contractor shall sign off that all devices (thermowells and threaded ports) needed are in place to correctly test and balance the system and calibrate all devices are installed in the piping for this flushing and cleaning activity.

3.8 PROCEDURE FOR HYDRONIC SYSTEMS

A. Systems installed with pressure independent control valves shall not require hydronic system balancing. Flow shall be verified and adjusted for the pressure independent valve assembly for field conditions using the pressure independent control valve manufacturer’s documented procedure for 25% of the total installed product. Exact locations of tested product to be coordinated with the commissioning agent.

3.9 PROCEDURES FOR MOTORS

A. Motors, 1/2 HP and Larger: Test at final balanced conditions and record the following data:

1. Manufacturer's name, model number, and serial number.
2. Motor horsepower rating.
3. Motor rpm.
4. Efficiency rating.
5. Nameplate and measured voltage, each phase.
6. Nameplate and measured amperage, each phase.
7. Starter thermal-protection-element rating.

B. Motors Driven by Variable-Frequency Controllers: Test for proper operation at speeds varying from minimum to maximum. Test the manual bypass of the controller to prove

proper operation. Record observations including name of controller manufacturer, model number, serial number, and nameplate data.

3.10 TOLERANCES

A. Set HVAC system's air flow rates and water flow rates within the following tolerances:

1. Supply, Return, and Exhaust Fans and Equipment with Fans: Plus or minus 10 percent.
2. Air Outlets and Inlets: Plus or minus 10 percent.
3. Cooling-Water Flow Rate: Plus or minus 10 percent.

3.11 REPORTING

A. Initial Construction-Phase Report: Based on examination of the Contract Documents as specified in "Examination" Article, prepare a report on the adequacy of design for systems' balancing devices. Recommend changes and additions to systems' balancing devices to facilitate proper performance measuring and balancing. Recommend changes and additions to HVAC systems and general construction to allow access for performance measuring and balancing devices.

B. Status Reports: Prepare monthly progress reports to describe completed procedures, procedures in progress, and scheduled procedures. Include a list of deficiencies and problems found in systems being tested and balanced. Prepare a separate report for each system and each building floor for systems serving multiple floors.

3.12 FINAL REPORT

A. General: Prepare a certified written report; tabulate and divide the report into separate sections for tested systems and balanced systems.

1. Include a certification sheet at the front of the report's binder, signed and sealed by the certified testing and balancing engineer.
2. Include a list of instruments used for procedures, along with proof of calibration.

B. Final Report Contents: In addition to certified field-report data, include the following:

1. Pump curves.
2. Fan curves.
3. Manufacturers' test data.
4. Field test reports prepared by system and equipment installers.
5. Other information relative to equipment performance; do not include Shop Drawings and product data.

C. General Report Data: In addition to form titles and entries, include the following data:

1. Title page.
2. Name and address of the TAB contractor.
3. Project name.
4. Project location.
5. Architect's name and address.
6. Engineer's name and address.
7. Contractor's name and address.
8. Report date.
9. Signature of TAB supervisor who certifies the report.
10. Table of Contents with the total number of pages defined for each section of the report. Number each page in the report.

11. Summary of contents including the following:

    a. Indicated versus final performance.
    b. Notable characteristics of systems.
    c. Description of system operation sequence if it varies from the Contract Documents.

12. Nomenclature sheets for each item of equipment.
13. Data for terminal units, including manufacturer's name, type, size, and fittings.
14. Notes to explain why certain final data in the body of reports vary from indicated values.

15. Test conditions for fans and pump performance forms including the following:

    a. Settings for outdoor-, return-, and exhaust-air dampers.
    b. Conditions of filters.
    c. Cooling coil, wet- and dry-bulb conditions.
    d. Face and bypass damper settings at coils.
    e. Fan drive settings including settings and percentage of maximum pitch diameter.
    f. Inlet vane settings for variable-air-volume systems.
    g. Settings for supply-air, static-pressure controller.
    h. Other system operating conditions that affect performance.

D. System Diagrams: Include schematic layouts of air and hydronic distribution systems. Present each system with single-line diagram and include the following:

1. Quantities of outdoor, supply, return, and exhaust airflows.
2. Water and steam flow rates.
3. Duct, outlet, and inlet sizes.
4. Pipe and valve sizes and locations.
5. Terminal units.

6. Balancing stations.
7. Position of balancing devices.

E. Air-Handling-Unit Test Reports: For air-handling units with coils, include the following:

1. Unit Data:

   a. Unit identification.
   b. Location.
   c. Make and type.
   d. Model number and unit size.
   e. Manufacturer's serial number.
   f. Unit arrangement and class.
   g. Discharge arrangement.
   h. Sheave make, size in inches, and bore.
   i. Center-to-center dimensions of sheave, and amount of adjustments in inches.
   j. Number, make, and size of belts.
   k. Number, type, and size of filters.

2. Motor Data:

   a. Motor make, and frame type and size.
   b. Horsepower and rpm.
   c. Volts, phase, and hertz.
   d. Full-load amperage and service factor.
   e. Sheave make, size in inches, and bore.
   f. Center-to-center dimensions of sheave, and amount of adjustments in inches.

3. Test Data (Indicated and Actual Values):

   a. Total air flow rate in cfm.
   b. Total system static pressure in inches wg.
   c. Fan rpm.
   d. Discharge static pressure in inches wg.
   e. Filter static-pressure differential in inches wg.
   f. Cooling-coil static-pressure differential in inches wg.
   g. Heating-coil static-pressure differential in inches wg.
   h. Outdoor airflow in cfm.
   i. Return airflow in cfm.
   j. Outdoor-air damper position.
   k. Return-air damper position.
   l. Vortex damper position.

F. Apparatus-Coil Test Reports:

1. Coil Data:

a. System identification.
b. Location.
c. Coil type.
d. Number of rows.
e. Fin spacing in fins per inch o.c.
f. Make and model number.
g. Face area in sq. ft.
h. Tube size in NPS.
i. Tube and fin materials.
j. Circuiting arrangement.

2. Test Data (Indicated and Actual Values):

a. Air flow rate in cfm.
b. Average face velocity in fpm.
c. Air pressure drop in inches wg.
d. Outdoor-air, wet- and dry-bulb temperatures in deg F.
e. Return-air, wet- and dry-bulb temperatures in deg F.
f. Entering-air, wet- and dry-bulb temperatures in deg F.
g. Leaving-air, wet- and dry-bulb temperatures in deg F.
h. Water flow rate in gpm.
i. Water pressure differential in feet of head or psig.
j. Entering-water temperature in deg F.
k. Leaving-water temperature in deg F.

G. Electric-Coil Test Reports: For electric furnaces, duct coils, and electric coils installed in central-station air-handling units, include the following:

1. Unit Data:

a. System identification.
b. Location.
c. Coil identification.
d. Capacity in Btu/h.
e. Number of stages.
f. Connected volts, phase, and hertz.
g. Rated amperage.
h. Air flow rate in cfm.
i. Face area in sq. ft.
j. Minimum face velocity in fpm.

2. Test Data (Indicated and Actual Values):

a. Heat output in Btu/h.
b. Air flow rate in cfm.
c. Air velocity in fpm.
d. Entering-air temperature in deg F.
e. Leaving-air temperature in deg F.

f. Voltage at each connection.
g. Amperage for each phase.

H. Fan Test Reports: For supply, return, and exhaust fans, include the following:

1. Fan Data:

a. System identification.
b. Location.
c. Make and type.
d. Model number and size.
e. Manufacturer's serial number.
f. Arrangement and class.
g. Sheave make, size in inches, and bore.
h. Center-to-center dimensions of sheave, and amount of adjustments in inches.

2. Motor Data:

a. Motor make, and frame type and size.
b. Horsepower and rpm.
c. Volts, phase, and hertz.
d. Full-load amperage and service factor.
e. Sheave make, size in inches, and bore.
f. Center-to-center dimensions of sheave, and amount of adjustments in inches.
g. Number, make, and size of belts.

3. Test Data (Indicated and Actual Values):

a. Total airflow rate in cfm.
b. Total system static pressure in inches wg.
c. Fan rpm.
d. Discharge static pressure in inches wg.
e. Suction static pressure in inches wg.

I. Round and Rectangular Duct Traverse Reports: Include a diagram with a grid representing the duct cross-section and record the following:

1. Report Data:

a. System and air-handling-unit number.
b. Location and zone.
c. Traverse air temperature in deg F.
d. Duct static pressure in inches wg.
e. Duct size in inches.
f. Duct area in sq. ft.

g. Indicated air flow rate in cfm.
h. Indicated velocity in fpm.
i. Actual air flow rate in cfm.
j. Actual average velocity in fpm.
k. Barometric pressure in psig.

J. Air-Terminal-Device Reports:

1. Unit Data:

a. System and air-handling unit identification.
b. Location and zone.
c. Apparatus used for test.
d. Area served.
e. Make.
f. Number from system diagram.
g. Type and model number.
h. Size.
i. Effective area in sq. ft.

2. Test Data (Indicated and Actual Values):

a. Air flow rate in cfm.
b. Air velocity in fpm.
c. Preliminary air flow rate as needed in cfm.
d. Preliminary velocity as needed in fpm.
e. Final air flow rate in cfm.
f. Final velocity in fpm.
g. Space temperature in deg F.

K. Pump Test Reports: Calculate impeller size by plotting the shutoff head on pump curves and include the following:

1. Unit Data:

a. Unit identification.
b. Location.
c. Service.
d. Make and size.
e. Model number and serial number.
f. Water flow rate in gpm.
g. Water pressure differential in feet of head or psig.
h. Required net positive suction head in feet of head or psig.
i. Pump rpm.
j. Impeller diameter in inches.
k. Motor make and frame size.
l. Motor horsepower and rpm.
m. Voltage at each connection.

n. Amperage for each phase.
o. Full-load amperage and service factor.
p. Seal type.

2. Test Data (Indicated and Actual Values):

a. Static head in feet of head or psig.
b. Pump shutoff pressure in feet of head or psig.
c. Actual impeller size in inches.
d. Full-open flow rate in gpm.
e. Full-open pressure in feet of head or psig.
f. Final discharge pressure in feet of head or psig.
g. Final suction pressure in feet of head or psig.
h. Final total pressure in feet of head or psig.
i. Final water flow rate in gpm.
j. Voltage at each connection.
k. Amperage for each phase.

L. Instrument Calibration Reports:

1. Report Data:

a. Instrument type and make.
b. Serial number.
c. Application.
d. Dates of use.
e. Dates of calibration.

3.13 INSPECTIONS

A. Initial Inspection:

1. After testing and balancing are complete, operate each system and randomly check measurements to verify that the system is operating according to the final test and balance readings documented in the final report.

2. Check the following for each system:

a. Measure airflow of at least 10 percent of air outlets.
b. Measure water flow of at least 5 percent of terminals.
c. Measure room temperature at each thermostat/temperature sensor. Compare the reading to the set point.
d. Verify that balancing devices are marked with final balance position.
e. Note deviations from the Contract Documents in the final report.

B. Final Inspection:

1. After initial inspection is complete and documentation by random checks verifies that testing and balancing are complete and accurately documented in the final report, request that a final inspection be made by Commissioning Authority.
2. The TAB contractor's test and balance engineer shall conduct the inspection in the presence of Commissioning Authority.
3. Commissioning Authority shall randomly select measurements, documented in the final report, to be rechecked. Rechecking shall be limited to either 10 percent of the total measurements recorded or the extent of measurements that can be accomplished in a normal 8-hour business day.
4. If rechecks yield measurements that differ from the measurements documented in the final report by more than the tolerances allowed, the measurements shall be noted as "FAILED."
5. If the number of "FAILED" measurements is greater than 10 percent of the total measurements checked during the final inspection, the testing and balancing shall be considered incomplete and shall be rejected.

C. TAB Work will be considered defective if it does not pass final inspections. If TAB Work fails, proceed as follows:

1. Recheck all measurements and make adjustments. Revise the final report and balancing device settings to include all changes; resubmit the final report and request a second final inspection.
2. If the second final inspection also fails, Owner may contract the services of another TAB contractor to complete TAB Work according to the Contract Documents and deduct the cost of the services from the original TAB contractor's final payment.

D. Prepare test and inspection reports.

3.14 ADDITIONAL TESTS

A. Within 90 days of completing TAB, perform additional TAB to verify that balanced conditions are being maintained throughout and to correct unusual conditions.

B. Seasonal Periods: If initial TAB procedures were not performed during near-peak summer and winter conditions, perform additional TAB during near-peak summer and winter conditions.

3.15 COMMISSIONING

A. Refer to Commissioning Specifications, Section 01 81 10, for related commissioning requirements.

B. Test and Balance contractor shall provide necessary support to complete necessary Pre-functional testing, Functional Testing, and any retesting required as required to complete the commissioning process.

END OF SECTION 23 05 93

SECTION 23 07 00 - HVAC INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Insulation Materials:

   a. Cellular glass.
   b. Flexible elastomeric.
   c. Mineral fiber.

2. Adhesives.
3. Mastics.
4. Sealants.
5. Factory-applied jackets.
6. Field-applied jackets.
7. Tapes.

B. Related Sections:

1. Division 21 Section "Fire-Suppression Systems Insulation."
2. Division 22 Section "Plumbing Insulation."
3. Division 23 Section "Metal Ducts" for duct liners.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include thermal conductivity, water-vapor permeance thickness, and jackets (both factory- and field-applied if any).

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

1. Detail application of protective shields, saddles, and inserts at hangers for each type of insulation and hanger.

2. Detail insulation application at elbows, fittings, dampers, specialties and flanges for each type of insulation.
3. Detail application of field-applied jackets.
4. Detail application at linkages of control devices.

C. Material Test Reports: From a qualified testing agency acceptable to authorities having jurisdiction indicating, interpreting, and certifying test results for compliance of insulation materials, sealers, attachments, cements, and jackets, with requirements indicated. Include dates of tests and test methods employed.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: Skilled mechanics who have successfully completed an apprenticeship program or another craft training program certified by the Department of Labor, Bureau of Apprenticeship and Training.

B. Fire-Test-Response Characteristics: Insulation and related materials shall have fire-test-response characteristics indicated, as determined by testing identical products per ASTM E 84, by a testing and inspecting agency acceptable to authorities having jurisdiction. Factory label insulation and jacket materials and adhesive, mastic, tapes, and cement material containers, with appropriate markings of applicable testing and inspecting agency.

1. Insulation Installed Indoors: Flame-spread index of 25 or less, and smoke-developed index of 50 or less.
2. Insulation Installed Outdoors: Flame-spread index of 75 or less, and smoke-developed index of 150 or less.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Packaging: Insulation material containers shall be marked by manufacturer with appropriate ASTM standard designation, type and grade, and maximum use temperature.

1.6 COORDINATION

A. Coordinate size and location of supports, hangers, and insulation shields specified in Division 23 Section "Hangers and Supports for HVAC Piping and Equipment."

B. Coordinate clearance requirements with piping Installer for piping insulation application, duct Installer for duct insulation application, and equipment Installer for equipment insulation application. Before preparing piping and ductwork Shop Drawings, establish and maintain clearance requirements for installation of insulation and field-applied jackets and finishes and for space required for maintenance.

1.7 SCHEDULING

A. Schedule insulation application after pressure testing systems and, where required, after installing and testing heat tracing. Insulation application may begin on segments that have satisfactory test results.

B. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

PART 2 - PRODUCTS

2.1 INSULATION MATERIALS

A. Comply with requirements in Part 3 schedule articles for where insulating materials shall be applied.

B. Products shall not contain asbestos, lead, mercury, or mercury compounds.

C. Products that come in contact with stainless steel shall have a leachable chloride content of less than 50 ppm when tested according to ASTM C 871.

D. Insulation materials for use on austenitic stainless steel shall be qualified as acceptable according to ASTM C 795.

E. Foam insulation materials shall not use CFC or HCFC blowing agents in the manufacturing process.

F. Cellular Glass: Inorganic, incombustible, foamed or cellulated glass with annealed, rigid, hermetically sealed cells. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide the following:

a. Pittsburgh Corning Corporation; Foamglas Super K.

2. Block Insulation: ASTM C 552, Type I.
3. Special-Shaped Insulation: ASTM C 552, Type III.
4. Board Insulation: ASTM C 552, Type IV.
5. Preformed Pipe Insulation with Factory-Applied ASJ: Comply with ASTM C 552, Type II, Class 2. ASJ jacketing for all piping areas outside of mechanical rooms.
6. Preformed Pipe Insulation with Field-Applied PVC jacketing: Comply with ASTM C 552, Type II, Class 2. PVC jacketing for all piping areas inside mechanical rooms.

7. Factory fabricate shapes according to ASTM C 450 and ASTM C 585.

G. Flexible Elastomeric: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I for tubular materials and Type II for sheet materials.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Aeroflex USA Inc.; Aerocel.
b. Armacell LLC; AP Armaflex.
c. RBX Corporation; Insul-Sheet 1800 and Insul-Tube 180.

2. Flexible Elastomeric Permitted Locations

a. Pump housing.
b. 4’-0” piping runout to AHU’s.

H. Mineral-Fiber Blanket Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 553, Type II and ASTM C 1290, Type I. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CertainTeed Corp.; Duct Wrap.
b. Johns Manville; Microlite.
c. Knauf Insulation; Duct Wrap.
d. Manson Insulation Inc.; Alley Wrap.
e. Owens Corning; All-Service Duct Wrap.

I. Mineral-Fiber Board Insulation: Mineral or glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IA or Type IB. For duct and plenum applications, provide insulation. For equipment applications, provide insulation. Factory-applied jacket requirements are specified in "Factory-Applied Jackets" Article.

1. Products: Subject to compliance with requirements, provide one of the following:

a. CertainTeed Corp.; Commercial Board.
b. Fibrex Insulations Inc.; FBX.
c. Johns Manville; 800 Series Spin-Glas.
d. Knauf Insulation; Insulation Board.
e. Manson Insulation Inc.; AK Board.
f. Owens Corning; Fiberglas 700 Series.

2.2 ADHESIVES

A. Materials shall be compatible with insulation materials, jackets, and substrates and for bonding insulation to itself and to surfaces to be insulated, unless otherwise indicated.

B. Cellular-Glass Adhesive: Solvent-based resin adhesive, with a service temperature range of minus 75 to plus 300 deg F.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Products, Division of ITW; CP-96.
b. Foster Products Corporation, H. B. Fuller Company; 81-33.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Flexible Elastomeric Adhesive: Comply with MIL-A-24179A, Type II, Class I.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Aeroflex USA Inc.; Aeroseal.
b. Armacell LCC; 520 Adhesive.
c. Foster Products Corporation, H. B. Fuller Company; 85-75.
d. RBX Corporation; Rubatex Contact Adhesive.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

D. Mineral-Fiber Adhesive: Comply with MIL-A-3316C, Class 2, Grade A.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Products, Division of ITW; CP-82.
b. Foster Products Corporation, H. B. Fuller Company; 85-20.
c. ITW TACC, Division of Illinois Tool Works; S-90/80.
d. Marathon Industries, Inc.; 225.
e. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, use adhesive that has a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. ASJ Adhesive, and FSK Jacket Adhesive: Comply with MIL-A-3316C, Class 2, Grade A for bonding insulation jacket lap seams and joints.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Products, Division of ITW; CP-82.
b. Foster Products Corporation, H. B. Fuller Company; 85-20.
c. ITW TACC, Division of Illinois Tool Works; S-90/80.
d. Marathon Industries, Inc.; 225.
e. Mon-Eco Industries, Inc.; 22-25.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

F. PVC Jacket Adhesive: Compatible with PVC jacket.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Dow Chemical Company (The); 739, Dow Silicone.
b. Johns-Manville; Zeston Perma-Weld, CEEL-TITE Solvent Welding Adhesive.
c. P.I.C. Plastics, Inc.; Welding Adhesive.
d. Speedline Corporation; Speedline Vinyl Adhesive.

2. For indoor applications, use adhesive that has a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.3 MASTICS

A. Materials shall be compatible with insulation materials, jackets, and substrates; comply with MIL-C-19565C, Type II.

B. Vapor-Barrier Mastic: Water based; suitable for indoor and outdoor use on below ambient services.

C. For indoor applications, use mastic that has a voc content of 50 G/L or less when calculated according to 40 CFR 59, subpart D (EPA Method 24).

1. Products: Subject to compliance with requirements, provide one of the following:

a. Childers Products, Division of ITW; CP-35.
b. Foster Products Corporation, H. B. Fuller Company; 30-90.
c. ITW TACC, Division of Illinois Tool Works; CB-50.
d. Marathon Industries, Inc.; 590.
e. Mon-Eco Industries, Inc.; 55-40.
f. Vimasco Corporation; 749.

2. Water-Vapor Permeance: ASTM E 96, Procedure B, 0.013 perm at 43-mil dry film thickness.
3. Service Temperature Range: Minus 20 to plus 180 deg F.
4. Solids Content: ASTM D 1644, 59 percent by volume and 71 percent by weight.
5. Color: White.

2.4 SEALANTS

A. Joint Sealants:

1. Joint Sealants for Cellular-Glass Products: Subject to compliance with requirements:

   a. Childers Products, Division of ITW; CP-76.
   b. Foster Products Corporation, H. B. Fuller Company; 30-45.
   c. Pittsburgh Corning Corporation; Pittseal 444.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Permanently flexible, elastomeric sealant.
4. Service Temperature Range: Minus 100 to plus 300 deg F.
5. Color: White or gray.
6. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. ASJ Flashing Sealants, and Vinyl, PVDC, and PVC Jacket Flashing Sealants:

1. Products: Subject to compliance with requirements, provide the following:

   a. Childers Products, Division of ITW; CP-76.

2. Materials shall be compatible with insulation materials, jackets, and substrates.
3. Fire- and water-resistant, flexible, elastomeric sealant.
4. Service Temperature Range: Minus 40 to plus 250 deg F.
5. Color: White.
6. For indoor applications, use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2.5 FACTORY-APPLIED JACKETS

A. Insulation system schedules indicate factory-applied jackets on various applications. When factory-applied jackets are indicated, comply with the following:

1. ASJ: White, kraft-paper, fiberglass-reinforced scrim with aluminum-foil backing; complying with ASTM C 1136, Type I.

2.6 FIELD-APPLIED JACKETS

A. Field-applied jackets shall comply with ASTM C 921, Type I, unless otherwise indicated.

B. PVC Jacket: High-impact-resistant, UV-resistant PVC complying with ASTM D 1784, Class 16354-C; thickness as scheduled; roll stock ready for shop or field cutting and forming. Thickness is indicated in field-applied jacket schedules.

1. Products: Subject to compliance with requirements, provide one of the following:

a. Johns Manville; Zeston.
b. P.I.C. Plastics, Inc.; FG Series.
c. Proto PVC Corporation; LoSmoke.
d. Speedline Corporation; SmokeSafe.

2. Adhesive: As recommended by jacket material manufacturer.
3. Color: White.

4. Factory-fabricated fitting covers to match jacket if available; otherwise, field fabricate.

   a. Shapes: 45- and 90-degree, short- and long-radius elbows, tees, valves, flanges, unions, reducers, end caps, soil-pipe hubs, traps, mechanical joints, and P-trap and supply covers for lavatories.

5. Factory-fabricated tank heads and tank side panels.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions for compliance with requirements for installation and other conditions affecting performance of insulation application.

   1. Verify that systems and equipment to be insulated have been tested and are free of defects.
   2. Verify that surfaces to be insulated are clean and dry.
   3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Surface Preparation: Clean and dry surfaces to receive insulation. Remove materials that will adversely affect insulation application.

B. Surface Preparation: Clean and prepare surfaces to be insulated. Before insulating, apply a corrosion coating to insulated surfaces as follows:

   1. Carbon Steel: Coat carbon steel operating at a service temperature between 32 and 300 deg F with an epoxy coating. Consult coating manufacturer for appropriate coating materials and application methods for operating temperature range.

C. Mix insulating cements with clean potable water; if insulating cements are to be in contact with stainless-steel surfaces, use demineralized water.

3.3 GENERAL INSTALLATION REQUIREMENTS

A. Install insulation materials, accessories, and finishes with smooth, straight, and even surfaces; free of voids throughout the length of equipment, ducts and fittings, and piping including fittings, valves, and specialties.

B. Install insulation materials, forms, vapor barriers or retarders, jackets, and thicknesses required for each item of equipment, duct system, and pipe system as specified in insulation system schedules.

C. Install accessories compatible with insulation materials and suitable for the service. Install accessories that do not corrode, soften, or otherwise attack insulation or jacket in either wet or dry state.

D. Install insulation with longitudinal seams at top and bottom of horizontal runs.

E. Install multiple layers of insulation with longitudinal and end seams staggered.

F. Do not weld brackets, clips, or other attachment devices to piping, fittings, and specialties.

G. Keep insulation materials dry during application and finishing.

H. Install insulation with tight longitudinal seams and end joints. Bond seams and joints with adhesive recommended by insulation material manufacturer.

I. Install insulation with least number of joints practical.

J. Where vapor barrier is indicated, seal joints, seams, and penetrations in insulation at hangers, supports, anchors, and other projections with vapor-barrier mastic.

   1. Install insulation continuously through hangers and around anchor attachments.
   2. For insulation application where vapor barriers are indicated, extend insulation on anchor legs from point of attachment to supported item to point of attachment to structure. Taper and seal ends at attachment to structure with vapor-barrier mastic.
   3. Install insert materials and install insulation to tightly join the insert. Seal insulation to insulation inserts with adhesive or sealing compound recommended by insulation material manufacturer.
   4. Cover inserts with jacket material matching adjacent pipe insulation. Install shields over jacket, arranged to protect jacket from tear or puncture by hanger, support, and shield.

K. Apply adhesives, mastics, and sealants at manufacturer's recommended coverage rate and wet and dry film thicknesses.

L. Install insulation with factory-applied jackets as follows:

1. Draw jacket tight and smooth.
2. Cover circumferential joints with 3-inch- wide strips, of same material as insulation jacket. Secure strips with adhesive and outward clinching staples along both edges of strip, spaced 4 inches o.c.

3. Overlap jacket longitudinal seams at least 1-1/2 inches. Install insulation with longitudinal seams at bottom of pipe. Clean and dry surface to receive self-sealing lap. Staple laps with outward clinching staples along edge at 2 inches o.c.

   a. For below ambient services, apply vapor-barrier mastic over staples.

4. Cover joints and seams with tape as recommended by insulation material manufacturer to maintain vapor seal.
5. Where vapor barriers are indicated, apply vapor-barrier mastic on seams and joints and at ends adjacent to duct and pipe flanges and fittings.

M. Cut insulation in a manner to avoid compressing insulation more than 75 percent of its nominal thickness.

N. Finish installation with systems at operating conditions. Repair joint separations and cracking due to thermal movement.

O. Repair damaged insulation facings by applying same facing material over damaged areas. Extend patches at least 4 inches beyond damaged areas. Adhere, staple, and seal patches similar to butt joints.

P. For above ambient services, do not install insulation to the following:

1. Vibration-control devices.
2. Testing agency labels and stamps.
3. Nameplates and data plates.
4. Manholes.
5. Handholes.
6. Cleanouts.

3.4 PENETRATIONS

A. Insulation Installation at Underground Exterior Wall Penetrations: Terminate insulation flush with sleeve seal. Seal terminations with flashing sealant.

B. Insulation Installation at Fire-Rated Wall and Partition Penetrations: Install insulation continuously through penetrations of fire-rated walls and partitions. Terminate insulation at fire damper sleeves for fire-rated wall and partition penetrations. Externally insulate damper sleeves to match adjacent insulation and overlap duct insulation at least 2 inches.

1. Comply with requirements in Division 07 Section "Penetration Firestopping" for firestopping and fire-resistive joint sealers.

3.5 EQUIPMENT, TANK, AND VESSEL INSULATION INSTALLATION

A. Flexible Elastomeric Thermal Insulation Installation for Tanks and Vessels: Install insulation over entire surface of tanks and vessels.

1. Apply 100 percent coverage of adhesive to surface with manufacturer's recommended adhesive.
2. Seal longitudinal seams and end joints.

B. Insulation Installation on Pumps:

1. Fabricate metal boxes lined with insulation. Fit boxes around pumps and coincide box joints with splits in pump casings. Fabricate joints with outward bolted flanges. Bolt flanges on 6-inch centers, starting at corners. Install 3/8-inch- diameter fasteners with wing nuts. Alternatively, secure the box sections together using a latching mechanism.
2. For below ambient services, install a vapor barrier at seams, joints, and penetrations. Seal between flanges with replaceable gasket material to form a vapor barrier.

3.6 GENERAL PIPE INSULATION INSTALLATION

A. Requirements in this article generally apply to all insulation materials except where more specific requirements are specified in various pipe insulation material installation articles.

B. Insulation Installation on Fittings, Valves, Strainers, Flanges, and Unions:

1. Install insulation over fittings, valves, strainers, flanges, unions, and other specialties with continuous thermal and vapor-retarder integrity, unless otherwise indicated.
2. Insulate pipe elbows using preformed fitting insulation or mitered fittings made from same material and density as adjacent pipe insulation. Each piece shall be butted tightly against adjoining piece and bonded with adhesive. Fill joints, seams, voids, and irregular surfaces with insulating cement finished to a smooth, hard, and uniform contour that is uniform with adjoining pipe insulation.
3. Insulate tee fittings with preformed fitting insulation or sectional pipe insulation of same material and thickness as used for adjacent pipe. Cut sectional pipe insulation to fit. Butt each section closely to the next and hold in place with tie wire. Bond pieces with adhesive.
4. Insulate valves using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe

insulation, or one pipe diameter, whichever is thicker. For valves, insulate up to and including the bonnets, valve stuffing-box studs, bolts, and nuts. Fill joints, seams, and irregular surfaces with insulating cement.

5. Insulate strainers using preformed fitting insulation or sectional pipe insulation of same material, density, and thickness as used for adjacent pipe. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker. Fill joints, seams, and irregular surfaces with insulating cement. Insulate strainers so strainer basket flange or plug can be easily removed and replaced without damaging the insulation and jacket. Provide a removable reusable insulation cover. For below ambient services, provide a design that maintains vapor barrier.
6. Insulate flanges and unions using a section of oversized preformed pipe insulation. Overlap adjoining pipe insulation by not less than two times the thickness of pipe insulation, or one pipe diameter, whichever is thicker.
7. Cover segmented insulated surfaces with a layer of finishing cement and coat with a mastic. Install vapor-barrier mastic for below ambient services and a breather mastic for above ambient services. Reinforce the mastic with fabric-reinforcing mesh. Trowel the mastic to a smooth and well-shaped contour.
8. Label the outside insulation jacket of each union with the word "UNION." Match size and color of pipe labels.

C. Insulate instrument connections for thermometers, pressure gages, pressure temperature taps, test connections, flow meters, sensors, switches, and transmitters on insulated pipes, vessels, and equipment. Shape insulation at these connections by tapering it to and around the connection with insulating cement and finish with finishing cement, mastic, and flashing sealant.

D. Install removable insulation covers at locations indicated. Installation shall conform to the following:

1. Make removable flange and union insulation from sectional pipe insulation of same thickness as that on adjoining pipe. Install same insulation jacket as adjoining pipe insulation.
2. When flange and union covers are made from sectional pipe insulation, extend insulation from flanges or union long at least two times the insulation thickness over adjacent pipe insulation on each side of flange or union. Secure flange cover in place with stainless-steel or aluminum bands. Select band material compatible with insulation and jacket.
3. Construct removable valve insulation covers in same manner as for flanges except divide the two-part section on the vertical center line of valve body.
4. When covers are made from block insulation, make two halves, each consisting of mitered blocks wired to stainless-steel fabric. Secure this wire frame, with its attached insulation, to flanges with tie wire. Extend insulation at least 2 inches over adjacent pipe insulation on each side of valve. Fill space between flange or union cover and pipe insulation with insulating cement. Finish cover assembly with insulating cement applied in two coats. After first coat is dry, apply and trowel second coat to a smooth finish.

5. Unless a PVC jacket is indicated in field-applied jacket schedules, finish exposed surfaces with a metal jacket.

3.7 CELLULAR-GLASS INSULATION INSTALLATION

A. Insulation Installation on Straight Pipes and Tubes:

1. Secure each layer of insulation to pipe with wire or bands and tighten bands without deforming insulation materials.
2. Where vapor barriers are indicated, seal longitudinal seams, end joints, and protrusions with vapor-barrier mastic and joint sealant.
3. For insulation with factory-applied jackets on above ambient services, secure laps with outward clinched staples at 6 inches o.c.

4. For insulation with factory-applied jackets on below ambient services, do not staple longitudinal tabs but secure tabs with additional adhesive as recommended by insulation material manufacturer and seal with vapor-barrier mastic and flashing sealant.

B. Insulation Installation on Pipe Flanges:

1. Install preformed pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of cellular-glass block insulation of same thickness as pipe insulation.
4. Install jacket material with manufacturer's recommended adhesive, overlap seams at least 1 inch, and seal joints with flashing sealant.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install preformed sections of same material as straight segments of pipe insulation when available. Secure according to manufacturer's written instructions.
2. When preformed sections of insulation are not available, install mitered sections of cellular-glass insulation. Secure insulation materials with wire or bands.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed sections of cellular-glass insulation to valve body.
2. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.

3.8 FLEXIBLE ELASTOMERIC INSULATION INSTALLATION

A. Seal longitudinal seams and end joints with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

B. Insulation Installation on Pipe Flanges:

1. Install pipe insulation to outer diameter of pipe flange.
2. Make width of insulation section same as overall width of flange and bolts, plus twice the thickness of pipe insulation.
3. Fill voids between inner circumference of flange insulation and outer circumference of adjacent straight pipe segments with cut sections of sheet insulation of same thickness as pipe insulation.
4. Secure insulation to flanges and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

C. Insulation Installation on Pipe Fittings and Elbows:

1. Install mitered sections of pipe insulation.
2. Secure insulation materials and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

D. Insulation Installation on Valves and Pipe Specialties:

1. Install preformed valve covers manufactured of same material as pipe insulation when available.
2. When preformed valve covers are not available, install cut sections of pipe and sheet insulation to valve body. Arrange insulation to permit access to packing and to allow valve operation without disturbing insulation.
3. Install insulation to flanges as specified for flange insulation application.
4. Secure insulation to valves and specialties and seal seams with manufacturer's recommended adhesive to eliminate openings in insulation that allow passage of air to surface being insulated.

3.9 MINERAL-FIBER INSULATION INSTALLATION

A. Blanket Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.

3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
b. On duct sides with dimensions larger than 18 inches, place pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
d. Do not overcompress insulation during installation.
e. Impale insulation over pins and attach speed washers.
f. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

   a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
   b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches.

5. Overlap unfaced blankets a minimum of 2 inches on longitudinal seams and end joints. At end joints, secure with steel bands spaced a maximum of 18 inches o.c.
6. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
7. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

B. Board Insulation Installation on Ducts and Plenums: Secure with adhesive and insulation pins.

1. Apply adhesives according to manufacturer's recommended coverage rates per unit area, for 100 percent coverage of duct and plenum surfaces.
2. Apply adhesive to entire circumference of ducts and to all surfaces of fittings and transitions.

3. Install either capacitor-discharge-weld pins and speed washers or cupped-head, capacitor-discharge-weld pins on sides and bottom of horizontal ducts and sides of vertical ducts as follows:

    a. On duct sides with dimensions 18 inches and smaller, place pins along longitudinal centerline of duct. Space 3 inches maximum from insulation end joints, and 16 inches o.c.
    b. On duct sides with dimensions larger than 18 inches, space pins 16 inches o.c. each way, and 3 inches maximum from insulation joints. Install additional pins to hold insulation tightly against surface at cross bracing.
    c. Pins may be omitted from top surface of horizontal, rectangular ducts and plenums.
    d. Do not overcompress insulation during installation.
    e. Cut excess portion of pins extending beyond speed washers or bend parallel with insulation surface. Cover exposed pins and washers with tape matching insulation facing.

4. For ducts and plenums with surface temperatures below ambient, install a continuous unbroken vapor barrier. Create a facing lap for longitudinal seams and end joints with insulation by removing 2 inches from 1 edge and 1 end of insulation segment. Secure laps to adjacent insulation section with 1/2-inch outward-clinching staples, 1 inch o.c. Install vapor barrier consisting of factory- or field-applied jacket, adhesive, vapor-barrier mastic, and sealant at joints, seams, and protrusions.

    a. Repair punctures, tears, and penetrations with tape or mastic to maintain vapor-barrier seal.
    b. Install vapor stops for ductwork and plenums operating below 50 deg F at 18-foot intervals. Vapor stops shall consist of vapor-barrier mastic applied in a Z-shaped pattern over insulation face, along butt end of insulation, and over the surface. Cover insulation face and surface to be insulated a width equal to 2 times the insulation thickness but not less than 3 inches.

5. Install insulation on rectangular duct elbows and transitions with a full insulation section for each surface. Groove and score insulation to fit as closely as possible to outside and inside radius of elbows. Install insulation on round and flat-oval duct elbows with individually mitered gores cut to fit the elbow.
6. Insulate duct stiffeners, hangers, and flanges that protrude beyond insulation surface with 6-inch- wide strips of same material used to insulate duct. Secure on alternating sides of stiffener, hanger, and flange with pins spaced 6 inches o.c.

3.10 FIELD-APPLIED JACKET INSTALLATION

A. Where PVC jackets are indicated, install with 1-inch overlap at longitudinal seams and end joints; for horizontal applications, install with longitudinal seams along top and bottom of tanks and vessels. Seal with manufacturer's recommended adhesive.

1. Apply two continuous beads of adhesive to seams and joints, one bead under lap and the finish bead along seam and joint edge.

3.11 FINISHES

A. Duct, Equipment, and Pipe Insulation with ASJ, Glass-Cloth, or Other Paintable Jacket Material: Paint jacket with paint system identified below and as specified in Division 09 painting Sections.

1. Flat Acrylic Finish: Two finish coats over a primer that is compatible with jacket material and finish coat paint. Add fungicidal agent to render fabric mildew proof.

a. Finish Coat Material: Interior, flat, latex-emulsion size.

B. Flexible Elastomeric Thermal Insulation: After adhesive has fully cured, apply two coats of insulation manufacturer's recommended protective coating.

C. Color: Final color as selected by Architect. Vary first and second coats to allow visual inspection of the completed Work.

3.12 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. Inspect ductwork, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three location(s) for each duct system defined in the "Duct Insulation Schedule, General" Article.
2. Inspect field-insulated equipment, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three location(s) for each type of equipment defined in the "Equipment Insulation Schedule" Article. For large equipment, remove only a portion adequate to determine compliance.
3. Inspect pipe, fittings, strainers, and valves, randomly selected by Architect, by removing field-applied jacket and insulation in layers in reverse order of their installation. Extent of inspection shall be limited to three locations of straight pipe, three locations of threaded fittings, three locations of welded fittings, two locations of threaded strainers, two locations of welded strainers, three locations

of threaded valves, and three locations of flanged valves for each pipe service defined in the "Piping Insulation Schedule, General" Article.

C. All insulation applications will be considered defective Work if sample inspection reveals noncompliance with requirements.

3.13 DUCT INSULATION SCHEDULE, GENERAL

A. Plenums and Ducts Requiring Insulation:

1. Indoor, concealed supply, return, and outdoor air.
2. Indoor, exposed supply, return, and outdoor air.
3. Indoor, concealed exhaust between isolation damper and penetration of building exterior.
4. Indoor, exposed exhaust between isolation damper and penetration of building exterior.

B. Items Not Insulated:

1. Factory-insulated flexible ducts.
2. Flexible connectors.
3. Factory-insulated access panels and doors.

3.14 INDOOR DUCT AND PLENUM INSULATION SCHEDULE

A. Concealed, round and flat-oval, supply-air duct insulation shall be the following:

1. Mineral-Fiber Blanket: 2 inches thick and 0.75-lb/cu. ft. nominal density.

B. Concealed, round and flat-oval, return-air duct insulation shall be the following:

1. Mineral-Fiber Blanket: 2 inches thick and 0.75-lb/cu. ft. nominal density.

C. Concealed, rectangular, supply-air duct insulation shall be the following:

1. Mineral-Fiber Blanket: 2 inches thick and 0.75-lb/cu. ft. nominal density.

D. Concealed, rectangular, return-air duct insulation shall be the following:

1. Mineral-Fiber Blanket: 2 inches thick and 0.75-lb/cu. ft. nominal density.

E. Exposed, rectangular, supply/return-air duct insulation inside mechanical rooms shall be the following:

1. Mineral-Fiber Board: 2 inches thick and 2-lb/cu. ft. nominal density.

F. Exposed, rectangular or round, supply/return-air duct insulation outside mechanical rooms shall be the following:

1. Mineral-Fiber Blanket: 2 inches thick and 2-lb/cu. ft. nominal density.

G. Concealed, return-air plenum insulation shall be the following:

1. Mineral-Fiber Blanket: 2 inches thick and 0.75-lb/cu. ft. nominal density.

3.15 EQUIPMENT INSULATION SCHEDULE

A. Insulation materials and thicknesses are identified below. If more than one material is listed for a type of equipment, selection from materials listed is Contractor's option.

B. Insulate indoor equipment in paragraphs below that is not factory insulated.

C. Chilled-water air-separator insulation shall be the following:

1. Flexible Elastomeric: 1-1/2 inch thick.

3.16 PIPING INSULATION SCHEDULE, GENERAL

A. Acceptable preformed pipe and tubular insulation materials and thicknesses are identified for each piping system and pipe size range. If more than one material is listed for a piping system, selection from materials listed is Contractor's option.

3.17 INDOOR PIPING INSULATION SCHEDULE

A. Chilled Water, above 40 Deg F:

1. NPS 2 and Smaller: Insulation shall be the following:

a. Cellular Glass: 1-1/2 inches thick.

2. NPS 2-1/2 and Larger: Insulation shall be the following:

a. Cellular Glass: 2 inches thick.

B. Refrigerant Suction and Hot-Gas Tubing/Piping:

1. All Pipe Sizes: Insulation shall be the following:

a. Flexible Elastomeric: 1 inch thick.

C. Condensate and Equipment Drain Water below 60 Deg F:

1. All Pipe Sizes: Insulation shall be the following:

   a. Flexible Elastomeric: 3/4 inch thick.

3.18 INDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Mechanical Rooms:

   1. PVC: 20 mils thick.

3.19 OUTDOOR, FIELD-APPLIED JACKET SCHEDULE

A. Install jacket over insulation material. For insulation with factory-applied jacket, install the field-applied jacket over the factory-applied jacket.

B. If more than one material is listed, selection from materials listed is Contractor's option.

C. Piping, Outdoor:

   1. Aluminum.

3.20 OUTDOOR, UNDERGROUND CHILLED WATER PIPING

A. All outdoor chilled water piping shall be pre-insulated metal piping with welded joints. Pre-insulated piping manufacturer shall provide shop drawings routing, thrust blocks, expansion loops, etc. for engineer’s review.

END OF SECTION 23 07 00

SECTION 23 08 00 - COMMISSIONING OF HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections, apply to this Section, including 019113 – General Commissioning Requirements.

1.2 SUMMARY

A. Section includes commissioning process requirements for HVAC&R systems, assemblies, and equipment.

B. Related Sections:

1. Refer to Division 01 Section 019113 “General Commissioning Requirements” for additional commissioning scope and requirements. All testing and commissioning requirements of that section shall be met.

1.3 CONTRACTOR'S RESPONSIBILITIES

A. Perform commissioning tests at the direction of the Commissioning Authority (CxA).

B. Attend construction phase controls coordination meeting.

C. Attend testing, adjusting, and balancing review and coordination meeting.

D. Participate in HVAC&R systems, assemblies, equipment, and component maintenance orientation and inspection as directed by the CxA.

E. Provide information requested by the CxA for final commissioning documentation.

F. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period.

1.4 CxA RESPONSIBILITIES

A. Provide project-specific construction checklists and commissioning process test procedures for actual HVAC&R systems, assemblies, equipment, and components to be furnished and installed as part of the construction contract.

B. Direct commissioning testing.

C. Verify testing, adjusting, and balancing of Work are complete.

D. Provide test data, inspection reports, and issues log in Final Report.

1.5 COMMISSIONING DOCUMENTATION

A. Provide the following information to the CxA for inclusion in the commissioning plan:

1. Plan for delivery and review of submittals, systems manuals, and other documents and reports.
2. Identification of installed systems, assemblies, equipment, and components including design changes that occurred during the construction phase.
3. Process and schedule for completing construction checklists and manufacturer's prestart and startup checklists for HVAC&R systems, assemblies, equipment, and components to be verified and tested.
4. Certificate of completion certifying that installation, prestart checks, and startup procedures have been completed.
5. Certificate of readiness certifying that HVAC&R systems, subsystems, equipment, and associated controls are ready for testing.
6. Test and inspection reports and certificates.
7. Corrective action documents.
8. Verification of testing, adjusting, and balancing reports.

1.6 SUBMITTALS

A. Certificates of readiness.

B. Certificates of completion of installation, prestart, and startup activities.

C. See other related specification sections for required submittals and manuals, including 019113 – General Commissioning Requirements.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TESTING PREPARATION

A. Certify that HVAC&R systems, subsystems, and equipment have been installed, calibrated, and started and are operating according to the Contract Documents.

B. Certify that HVAC&R instrumentation and control systems have been completed and calibrated, that they are operating according to the Contract Documents, and that pretest set points have been recorded.

C. Certify that testing, adjusting, and balancing procedures have been completed and that testing, adjusting, and balancing reports have been submitted, discrepancies corrected, and corrective work approved.

D. Set systems, subsystems, and equipment into operating mode to be tested (e.g., normal shutdown, normal auto position, normal manual position, unoccupied cycle, emergency power, and alarm conditions).

E. Inspect and verify the position of each device and interlock identified on checklists.

F. Check safety cutouts, alarms, and interlocks during each mode of operation.

G. Testing Instrumentation: Install measuring instruments and logging devices to record test data as directed by the CxA.

3.2 TESTING AND BALANCING VERIFICATION

A. Prior to performance of testing and balancing work, provide copies of reports, sample forms, checklists, and certificates to the CxA.

B. Notify the CxA at least 10 days in advance of testing and balancing work, and provide access for the CxA to witness testing and balancing work.

C. Provide technicians, instrumentation, and tools to verify testing and balancing of HVAC&R systems at the direction of the CxA.

1. The CxA will notify testing and balancing Contractor 10 days in advance of the date of field verification. Notice will not include data points to be verified.
2. The testing and balancing Contractor shall use the same instruments (by model and serial number) that were used when original data were collected.
3. Failure of an item includes, other than sound, a deviation of more than 10 percent. Failure of more than 10 percent of selected items shall result in rejection of final testing, adjusting, and balancing report. For sound pressure readings, a deviation of 3 dB shall result in rejection of final testing. Variations in background noise must be considered.
4. Remedy the deficiency and notify the CxA so verification of failed portions can be performed.

3.3 GENERAL TESTING REQUIREMENTS

A. Provide technicians, instrumentation, and tools to perform commissioning test at the direction of the CxA.

B. Scope of HVAC&R testing shall include entire HVAC&R installation, from central equipment for heat generation and refrigeration through distribution systems to each conditioned space. Testing shall include measuring capacities and effectiveness of operational and control functions.

1. Testing Strategies and Sampling: Refer to section 019113 for testing of equipment strategies and sampling requirement functional performance test requirements.

C. Test all operating modes, interlocks, control responses, and responses to abnormal or emergency conditions, and verify proper response of building automation system controllers and sensors.

D. The CxA along with the HVAC&R Contractor, testing and balancing Contractor, and HVAC&R Instrumentation and Control Contractor shall prepare detailed testing plans, procedures, and checklists for HVAC&R systems, subsystems, and equipment.

E. Tests will be performed using design conditions whenever possible.

F. Simulated conditions may need to be imposed using an artificial load when it is not practical to test under design conditions. Before simulating conditions, calibrate testing instruments. Provide equipment to simulate loads. Set simulated conditions as directed by the CxA and document simulated conditions and methods of simulation. After tests, return settings to normal operating conditions.

G. The CxA may direct that set points be altered when simulating conditions is not practical.

H. The CxA may direct that sensor values be altered with a signal generator when design or simulating conditions and altering set points are not practical.

I. If tests cannot be completed because of a deficiency outside the scope of the HVAC&R system, document the deficiency and report it to the Owner. After deficiencies are resolved, reschedule tests.

J. If the testing plan indicates specific seasonal testing, complete appropriate initial performance tests and documentation and schedule seasonal tests.

3.4 HVAC&R SYSTEMS, SUBSYSTEMS, AND EQUIPMENT TESTING PROCEDURES

A. Boiler Testing and Acceptance Procedures: Testing requirements are specified in Division 23 boiler sections. Provide submittals, test data, inspector record, and boiler certification to the CxA.

B. HVAC&R Instrumentation and Control System Testing: Field testing plans and testing requirements are specified in Division 23 Sections "Instrumentation and Control for

HVAC" and "Sequence of Operations for HVAC Controls." Assist the CxA with preparation of testing plans.

C. Pipe system cleaning, flushing, hydrostatic tests, and chemical treatment requirements are specified in Division 23 piping Sections. HVAC&R Contractor shall prepare a pipe system cleaning, flushing, and hydrostatic testing plan. Provide cleaning, flushing, testing, and treating plan and final reports to the CxA. Plan shall include the following:

1. Sequence of testing and testing procedures for each section of pipe to be tested, identified by pipe zone or sector identification marker. Markers shall be keyed to Drawings for each pipe sector, showing the physical location of each designated pipe test section. Drawings keyed to pipe zones or sectors shall be formatted to allow each section of piping to be physically located and identified when referred to in pipe system cleaning, flushing, hydrostatic testing, and chemical treatment plan.
2. Description of equipment for flushing operations.
3. Minimum flushing water velocity.
4. Tracking checklist for managing and ensuring that all pipe sections have been cleaned, flushed, hydrostatically tested, and chemically treated.

D. Energy Supply System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of hot-water systems and equipment at the direction of the CxA. The CxA shall determine the sequence of testing and testing procedures for each equipment item and pipe section to be tested.

E. Refrigeration System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of chillers, cooling towers, refrigerant compressors and condensers, heat pumps, and other refrigeration systems. The CxA shall determine the sequence of testing and testing procedures for each equipment item and pipe section to be tested.

F. HVAC&R Distribution System Testing: Provide technicians, instrumentation, tools, and equipment to test performance of air, steam, and hydronic distribution systems; special exhaust; and other distribution systems, including HVAC&R terminal equipment and unitary equipment.

G. Vibration and Sound Tests: Provide technicians, instrumentation, tools, and equipment to test performance of vibration isolation and seismic controls.

3.5 NONCONFORMANCE

A. The CxA will record the results of the Functional Performance Tests. All deficiencies, nonconformance issues, or test failures will be noted and reported to the Contractors in a deficiency list or in a punch-list format.

B. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CxA. In such cases the deficiency and resolution will be documented on the procedure form.

C. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the CxA will not be pressured into overlooking deficient work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so at the request of the Owners Representative.

D. Retesting:

1. If a Functional Performance Test fails, corrections shall be made to the deficient equipment or systems by the Contractors. The systems will be re-tested until they pass the Tests.
2. The time/cost for the CxA to perform any retesting required because of improper set up of the systems by the contractors or failed functional or performance tests will be back-charged to the Contractor (who may choose to recover costs from the party responsible for executing faulty equipment startup/checkout and associated checklists). This includes instances where a specific item was overlooked in the equipment startup and checkout procedures, reported to have been successfully completed but determined during Functional Performance testing to be faulty.
3. Any required retesting by any contractor, sub-contractor, or vendor shall not be considered a justified reason for a claim of delay or for a time extension by the Contractor.

3.6 DEFICIENCIES AND RETESTING

A. The CxA documents the results of each test. (Corrections of minor installation or sequence of operation deficiencies are made during tests at the discretion of CxA.)

B. Deficiencies/nonconformance issues not corrected during testing are reported to the Contractors for corrective action. Upon completion, a request is made by the Contractors to CxA for retest.

END OF SECTION 23 08 00

SECTION 23 09 00 - INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes control equipment for HVAC systems and components, including control components for terminal heating and cooling units not supplied with factory-wired controls, and Lab Controls.

B. Related Sections include the following:

1. Division 23 Section "Meters and Gages for HVAC Piping" for measuring equipment that relates to this Section.

1.3 DEFINITIONS

A. BAS: Direct digital control.

B. I/O: Input/output.

C. MS/TP: Master slave/token passing.

D. PC: Personal computer.

E. PID: Proportional plus integral plus derivative.

F. BAS: Building Automation System

1.4 SYSTEM PERFORMANCE

A. Comply with the following performance requirements:

1. Graphic Display: Display graphic with minimum 20 dynamic points with current data within 10 seconds.
2. Graphic Refresh: Update graphic with minimum 20 dynamic points with current data within 8 seconds.

3. Object Command: Reaction time of less than two seconds between operator command of a binary object and device reaction.
4. Object Scan: Transmit change of state and change of analog values to control units or workstation within six seconds.
5. Alarm Response Time: Annunciate alarm at workstation within 45 seconds. Multiple workstations must receive alarms within five seconds of each other.
6. Program Execution Frequency: Run capability of applications as often as five seconds, but selected consistent with mechanical process under control.
7. Performance: Programmable controllers shall execute BAS PID control loops, and scan and update process values and outputs at least once per second.

8. Reporting Accuracy and Stability of Control: Report values and maintain measured variables within tolerances as follows:

   a. Water Temperature: Plus or minus 1 deg F.
   b. Water Flow: Plus or minus 2 percent of full scale.
   c. Water Pressure: Plus or minus 5 percent of full scale.
   d. Space Temperature: Plus or minus 1 deg F.
   e. Ducted Air Temperature: Plus or minus 1 deg F.
   f. Outside Air Temperature: Plus or minus 2 deg F.
   g. Dew Point Temperature: Plus or minus 3 deg F.
   h. Temperature Differential: Plus or minus 0.25 deg F.
   i. Relative Humidity: Plus or minus 2 percent.
   j. Airflow (Pressurized Spaces): Plus or minus 3 percent of full scale.
   k. Airflow (Measuring Stations): Plus or minus 5 percent of full scale.
   l. Airflow (Terminal): Plus or minus 10 percent of full scale.
   m. Air Pressure (Space): Plus or minus 0.01-inch wg.
   n. Air Pressure (Ducts): Plus or minus 0.1-inch wg.
   o. Electrical: Plus or minus 5 percent of reading.

1.5 SEQUENCE OF OPERATION

A. See Control Diagrams on Design Documents for Sequences of Operations.

1.6 SUBMITTALS

A. Product Data: Include manufacturer's technical literature for each control device. Indicate dimensions, capacities, performance characteristics, electrical characteristics, finishes for materials, and installation and startup instructions for each type of product indicated.

   1. BAS System Hardware: Bill of materials of equipment indicating quantity, manufacturer, and model number. Include technical data for operator workstation equipment, interface equipment, control units, transducers/transmitters, sensors, actuators, valves, relays/switches, control panels, and operator interface equipment.

2. Control System Software: Include technical data for operating system software, operator interface, color graphics, and other third-party applications.
3. Controlled Systems: Instrumentation list with element name, type of device, manufacturer, model number, and product data. Include written description of sequence of operation including schematic diagram.

B. Shop Drawings: Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.

1. Bill of materials of equipment indicating quantity, manufacturer, and model number.
2. Schematic flow diagrams showing fans, pumps, coils, dampers, valves, and control devices.
3. Wiring Diagrams: Power, signal, and control wiring.
4. Details of control panel faces, including controls, instruments, and labeling.
5. Written description of sequence of operation.
6. Schedule of dampers including size, leakage, and flow characteristics.
7. Schedule of valves including flow characteristics.

8. BAS System Hardware:

   a. Wiring diagrams for control units with termination numbers.
   b. Schematic diagrams and floor plans for field sensors and control hardware.
   c. Schematic diagrams for control, communication, and power wiring, showing trunk data conductors and wiring between operator workstation and control unit locations.

9. Control System Software: List of color graphics indicating monitored systems, data (connected and calculated) point addresses, output schedule, and operator notations.

10. Controlled Systems:

    a. Schematic diagrams of each controlled system with control points labeled and control elements graphically shown, with wiring.
    b. Scaled drawings showing mounting, routing, and wiring of elements including bases and special construction.
    c. Written description of sequence of operation including schematic diagram.
    d. Points list.

11. All HVAC control system submittals, as-builts, graphics, alarms and programming shall use the same equipment and device naming convention used on the construction documents.

12. PICS (Performance Interoperability Conformance Statements)

a. Contractor shall provide for each type of equipment being supplied by all contracting trades.

C. Data Communications Protocol Certificates: Certify that each proposed BAS system component complies with ASHRAE 135.

D. Software and Firmware Operational Documentation: Include the following:

1. Software operating and upgrade manuals.
2. Program Software Backup: On a magnetic media or compact disc, complete with data files.
3. Device address list.
4. Printout of software application and graphic screens.
5. Software license required by and installed for BAS workstations and control systems.

E. Field quality-control test reports.

F. Operation and Maintenance Data: For HVAC instrumentation and control system to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Maintenance instructions and lists of spare parts for each type of control device and compressed-air station.
2. Interconnection wiring diagrams with identified and numbered system components and devices.
3. Keyboard illustrations and step-by-step procedures indexed for each operator function.
4. Inspection period, cleaning methods, cleaning materials recommended, and calibration tolerances.
5. Calibration records and list of set points.
6. Refer to 230010 for additional requirements.

1.7 QUALITY ASSURANCE

A. Installer Qualifications: Automatic control system manufacturer's authorized representative who is trained and approved for installation of system components required for this Project.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with ASHRAE 135 for BAS system components.

D. All HVAC control system components shall be BACnet BTL 135.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Factory-Mounted Components: Where control devices specified in this Section are indicated to be factory mounted on equipment, arrange for shipping of control devices to equipment manufacturer.

B. System Software: Update to latest version of software at Project completion.

1.9 COORDINATION

A. Coordinate location of thermostats, humidistats, and other exposed control sensors with plans and room details before installation.

B. Coordinate equipment with Division 27 Section "Clock Systems" to achieve compatibility with equipment that interfaces with that system.

C. Coordinate equipment with Division 26 Section "Network Lighting Controls" to achieve compatibility with equipment that interfaces with that system.

D. Coordinate supply of conditioned electrical branch circuits for control units and operator workstation.

E. Coordinate equipment with Division 26 Section "Electrical Power Monitoring and Control" to achieve compatibility of communication interfaces.

F. Coordinate equipment with Division 26 Section "Panelboards" to achieve compatibility with starter coils and annunciation devices.

G. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified in Division 03 Section "Cast-in-Place Concrete."

H. Coordinate with Commissioning Agent for Commissioning of systems in accordance with Commissioning Specifications, Commissioning Plan, and Drawings and specifications.

I. Coordinate with Test and Balance Company in accordance with Commissioning Specifications, Commissioning Plan, and Drawings and specifications.

1. The project’s DDC system shall be completed and confirmed in writing by the responsible contractor prior to final TAB activities taking place. The intent is to allow the TAB contractor to verify system operation in its final configuration and minimize inconsistencies introduced by changes to the DDC system.

2. The final TAB activities shall not proceed until the BAS system has been completed. Written confirmation and a copy of the current programming and graphics shall be provided to the College.

1.10 EXTRA MATERIALS

A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Replacement Materials: One replacement diaphragm or relay mechanism for each unique valve motor.
2. Refer to 230010 for additional spare parts requirements.

3. Spare materials shall be provided as a part of this project. In addition to any requirements in the drawings and/or specifications, the following items shall be provided:

a. 5 of each type of temperature sensor
b. 1 of each type of humidity sensor
c. 1 of each type of CO2 or VOC sensor
d. 1 of each type of dry differential pressure sensor and/or switch
e. 1 of each type of wet differential pressure sensor and/or switch
f. 1 of each type of air flow measuring station
g. 1 of each type of CT
h. 1 of each type of actuator
i. 1 of each type of BAS controller
j. 1 of ANY critical of long lead items
k. 2 of each type of BAS controller
l. 1 extra of any BAS interface

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.2 CONTROL SYSTEM

A. Manufacturers:

1. Siemens
2. Trane
3. Automated Logic

B. BTL listed products, if available, must be provided.

C. Selected Controls System provider shall implement latest published revision of controller, server, and workstation firmware and software. This includes all work for updates and/or changes that are necessary or required to vendor's existing control equipment.

D. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, and accessories to control mechanical systems.

E. Control system shall consist of sensors, indicators, actuators, final control elements, interface equipment, other apparatus, accessories, and software connected to distributed controllers operating in multiuser, multitasking environment on token-passing network and programmed to control mechanical systems. An operator workstation permits interface with the network via dynamic color graphics with each mechanical system, building floor plan, and control device depicted by point-and-click graphics.

1. Controls and Graphics shall be in accordance with Valencia College Controls standards, including but not limited to Hardware, software, software, programming, trending, alarming, remote monitoring, energy reports, daily reports, monthly reports, annual reports…).

F. The BAS shall be a web-enabled system with a secure interface. A static IP address and connectivity will be provided by Valencia College to utilize the web based interface with their campus system.

G. Control system shall include the following:

1. Building lighting control system specified in Division 26 Section "Network Lighting Controls."

   a. BMS contractor shall provide a digital signal to the network lighting controllers for operation of all lighting systems for the facility.
   b. BMS contractor shall provide a 7 day/365 days a year schedule for programming the operation of the lighting system.

2. Power Monitoring of Electric Water Heaters.
3. Domestic and Reclaim Water Metering.
4. Trending and Alarming required to implement any measurement and verification required by Part D of the IMPMV guidelines and measurement and verification plan.

5. Gateways and Integration as required for a complete system in accordance with drawings and specifications.

2.3 BAS EQUIPMENT

A. Operator Workstation: One PC-based microcomputer(s) with minimum configuration as follows:

1. Motherboard: With 8 integrated USB 2.0 ports, integrated Intel Pro 10/100 (Ethernet), integrated audio, bios, and hardware monitoring.
2. Processor: Intel Xeon Dual Core 2.8 GHz (64 bit)
3. Random-Access Memory: 32 GB, 1333 MHz, DDR3 SDRAM.
4. Graphics: Video adapter, minimum 1800 x 1200 pixels, 512 MB video memory, dual-monitor capable.
5. Monitor: 24 inches, LCD color, widescreen.
6. Keyboard: QWERTY, 105 keys.
7. Hard-Disk Drive: 1024 GB.
8. Optical Drive: 16X DVD+/-RW.
9. Media Drive: Internal 19-in-1 USB 2.0 Media Card reader
10. Mouse: Three button, optical with wheel.
11. Uninterruptible Power Supply: 2000 VA.
12. Operating System: Microsoft Windows 7 Professional.

B. Control Units: Modular, comprising processor board with programmable, nonvolatile, random-access memory; local operator access and display panel; integral interface equipment; and backup power source.

1. Units monitor or control each I/O point; process information; execute commands from other control units, devices, and operator stations; and download from or upload to operator workstation or diagnostic terminal unit.

2. Stand-alone mode control functions operate regardless of network status. Functions include the following:

   a. Global communications.
   b. Discrete/digital, analog, and pulse I/O.
   c. Monitoring, controlling, or addressing data points.
   d. Software applications, scheduling, and alarm processing.
   e. Testing and developing control algorithms without disrupting field hardware and controlled environment.

3. Standard Application Programs:

   a. Electric Control Programs: Demand limiting, duty cycling, automatic time scheduling, start/stop time optimization, night setback/setup, on-off control with differential sequencing, staggered start, antishort cycling, PID control, BAS with fine tuning, and trend logging.

b. HVAC Control Programs: Optimal run time, supply-air reset, and enthalpy switchover.
c. Programming Application Features: Include trend point; alarm processing and messaging; weekly, monthly, and annual scheduling; energy calculations; run-time totalization; and security access.
d. Remote communications.
e. Maintenance management.
f. Units of Measure: Inch-pound and SI (metric).

4. Local operator interface provides for download from or upload to operator workstation or diagnostic terminal unit.
5. ASHRAE 135 Compliance: Control units shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.

C. Local Control Units: Modular, comprising processor board with electronically programmable, nonvolatile, read-only memory; and backup power source.

1. Units monitor or control each I/O point, process information, and download from or upload to operator workstation or diagnostic terminal unit.

2. Stand-alone mode control functions operate regardless of network status. Functions include the following:

a. Global communications.
b. Discrete/digital, analog, and pulse I/O.
c. Monitoring, controlling, or addressing data points.

3. Local operator interface provides for download from or upload to operator workstation or diagnostic terminal unit.
4. ASHRAE 135 Compliance: Control units shall use ASHRAE 135 protocol and communicate using ISO 8802-3 (Ethernet) datalink/physical layer protocol.

D. I/O Interface: Hardwired inputs and outputs may tie into system through controllers. Protect points so that shorting will cause no damage to controllers.

1. Binary Inputs: Allow monitoring of on-off signals without external power.
2. Pulse Accumulation Inputs: Accept up to 10 pulses per second.
3. Analog Inputs: Allow monitoring of low-voltage (0- to 10-V dc), current (4 to 20 mA), or resistance signals.
4. Binary Outputs: Provide on-off or pulsed low-voltage signal, selectable for normally open or normally closed operation.
5. Analog Outputs: Provide modulating signal, either low voltage (0- to 10-V dc) or current (4 to 20 mA).
6. Tri-State Outputs: Provide two coordinated binary outputs for control of three-point, floating-type electronic actuators.
7. Universal I/Os: Provide software selectable binary or analog outputs.

E. Power Supplies: Transformers with Class 2 current-limiting type or overcurrent protection; limit connected loads to 80 percent of rated capacity. DC power supply shall match output current and voltage requirements and be full-wave rectifier type with the following:

1. Output ripple of 5.0 mV maximum peak to peak.
2. Combined 1 percent line and load regulation with 100-mic.sec. response time for 50 percent load changes.
3. Built-in overvoltage and overcurrent protection and be able to withstand 150 percent overload for at least 3 seconds without failure.

F. Power Line Filtering: Internal or external transient voltage and surge suppression for workstations or controllers with the following:

1. Minimum dielectric strength of 1000 V.
2. Maximum response time of 10 nanoseconds.
3. Minimum transverse-mode noise attenuation of 65 dB.
4. Minimum common-mode noise attenuation of 150 dB at 40 to 100 Hz.

G. Third Party Devices: Third party devices shall be connected to building automation system through MS/TP communication bus at the fastest supported bps to the associated controller with the function in which they are being utilized.

1. The following devices shall be provided and connected to the Building Automation System with a BACnet Testing Laboratories BTL listed MS/TP communications card. If communication card is not available then an owner approved BTL Listed Proxy device or Non-BTL listed card may be used. Device object names must clearly indicate the object that is being represented or a proxy device may be required.

   a. VFD’s
   b. Electrical Main Meter
   c. Electrical Submeters
   d. Lighting Control Panels
   e. Chilled Water Energy Meters
   f. Domestic Water Meter
   g. Irrigation Water Meter
   h. Chemical Treatment System
   i. Chillers
   j. Solar Hot Water Control System.
   k. Solar Hot Water Energy Meters

2.4 ELECTRONIC SENSORS

A. Description: Vibration and corrosion resistant; for wall, immersion, or duct mounting as required.

B. Thermistor Temperature Sensors and Transmitters:

1. Manufacturers:

   a. Ebtron, Inc.
   b. I.T.M. Instruments Inc.
   c. RDF Corporation.

2. Accuracy: Plus or minus 0.5 deg F at calibration point.
3. Wire: Twisted, shielded-pair cable.
4. Insertion Elements in Ducts: Single point, 8 inches long; use where not affected by temperature stratification or where ducts are smaller than 9 sq. ft.
5. Averaging Elements in Ducts: 18 inches long, rigid; use where prone to temperature stratification or where ducts are larger than 10 sq. ft.
6. Insertion Elements for Liquids: Brass or stainless-steel socket with minimum insertion length of 2-1/2 inches.

7. Room Sensor Cover Construction: Manufacturer's standard locking covers.

   a. Set-Point Adjustment: Exposed.
   b. Set-Point Indication: Concealed.
   c. Thermometer: Concealed.
   d. Color: White.
   e. Orientation: Vertical.

8. Outside-Air Sensors: Watertight inlet fitting, shielded from direct sunlight.
9. Room Security Sensors: Stainless-steel cover plate with insulated back and security screws.

C. Humidity Sensors: Bulk polymer sensor element.

1. Manufacturers:

   a. BEC Controls Corporation.
   b. General Eastern Instruments.
   c. MAMAC Systems, Inc.
   d. ROTRONIC Instrument Corp.
   e. TCS/Basys Controls.
   f. Vaisala.

2. Accuracy: 2 percent full range with linear output.
3. Room Sensor Range: 20 to 80 percent relative humidity.
4. Room Sensor Cover Construction: Manufacturer's standard locking covers.

   a. Set-Point Adjustment: Concealed.
   b. Set-Point Indication: Concealed.
   c. Color: White.
   d. Orientation: Vertical.

5. Duct Sensor: 20 to 80 percent relative humidity range with element guard and mounting plate.
6. Outside-Air Sensor: 20 to 80 percent relative humidity range with mounting enclosure, suitable for operation at outdoor temperatures of minus 22 to plus 185 deg F.
7. Duct and Sensors: With element guard and mounting plate, range of 0 to 100 percent relative humidity.

D. Pressure Transmitters/Transducers:

1. Manufacturers:

   a. BEC Controls Corporation.
   b. General Eastern Instruments.
   c. MAMAC Systems, Inc.
   d. ROTRONIC Instrument Corp.
   e. TCS/Basys Controls.
   f. Vaisala.

2. Static-Pressure Transmitter: Nondirectional sensor with suitable range for expected input, and temperature compensated.

   a. Accuracy: 2 percent of full scale with repeatability of 0.5 percent.
   b. Output: 4 to 20 mA.
   c. Building Static-Pressure Range: 0- to 0.25-inch wg.
   d. Duct Static-Pressure Range: 0- to 5-inch wg.

3. Water Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum 150-psig operating pressure; linear output 4 to 20 mA.
4. Water Differential-Pressure Transducers: Stainless-steel diaphragm construction, suitable for service; minimum 150-psig operating pressure and tested to 300-psig; linear output 4 to 20 mA.
5. Differential-Pressure Switch (Air or Water): Snap acting, with pilot-duty rating and with suitable scale range and differential.
6. Pressure Transmitters: Direct acting for gas, liquid, or steam service; range suitable for system; linear output 4 to 20 mA.

2.5 STATUS SENSORS

A. Status Inputs for Fans: Differential-pressure switch with pilot-duty rating and with adjustable range of 0- to 5-inch wg.

B. Status Inputs for Pumps: Differential-pressure switch with pilot-duty rating and with adjustable pressure-differential range of 8 to 60 psig, piped across pump.

C. Status Inputs for Electric Motors: Comply with ISA 50.00.01, current-sensing fixed- or split-core transformers with self-powered transmitter, adjustable and suitable for 175 percent of rated motor current.

D. Current Switches: Self-powered, solid-state with adjustable trip current, selected to match current and system output requirements.

2.6 FLOW MEASURING STATIONS

A. Air Flow Measuring Device: Provide where indicated multi-point thermal dispersion airflow traverse stations for continuous measurement of air volume. Each traverse station shall consist of a multiple array Dual “bead-in-glass” sensing locations. Air flow measurement station shall be sized to match actual duct size. Sensor density shall comply with manufactures recommendations (Density type) to insure specified accuracy in actual installation field conditions/location.

1. Air flow measurement station shall be + 2% of reading, with 0.25% repeatability.

a. Provide Bacnet interface for BMS system interface. BMS shall monitor the following points at each AFM location:

1) Instaneous Airflow
2) Time weighted airflow average
3) Temperature

b. Acceptable Manufacture/Model:

1) Ebtron Gold Series - GTN116-PD
2) Or approved equal

B. Chilled Water Flow and Heating Hot Water Electromagnetic Flow BTU Meters: Provide chilled/hot water monitoring station consisting of a chilled/hot water flow meter, chilled/hot water supply and return water temperature sensors utilizing matching calibrated sensors.

1. The BCS shall monitor chilled water usage in "ton-hours" or "kiloton-hours", with an accuracy of plus or minus 0.75% with a turn down range from 0.1fps to 33 fps.

2. Provide Bacnet interface for BMS system interface. BMS shall monitor the following points at each AFM location:

a. Acceptable Manufacture/Model:

1) Onicon F3500 with System 10 BTU Meter
2) Or approved equal

C. Chilled Water Flow and Heating Hot Water Electromagnetic Flow Meters: Provide chilled/hot water monitoring station consisting of a chilled/hot water flow meter.

1. The BCS shall monitor chilled water usage, with an accuracy of plus or minus 0.75% with a turn down range from 0.1fps to 33 fps.

2. Provide Bacnet interface for BMS system interface. BMS shall monitor the following points at each AFM location:

a. Acceptable Manufacture/Model:

1) Onicon F3500 Insertion
2) Or approved equal

D. Domestic Water Flow:

1. Pulse Width Modulating Type (Mass Displacement)

2. Provide Bacnet interface for BMS system interface. BMS shall monitor the following points:

a. Total Flow

3. Acceptable Manufacture:

a. Badger Meters, E-Series Meter with Bacnet Interface.
b. Or approved equal

E. Reclaimed Water Flow:

1. Pulse Width Modulating Type (Mass Displacement)

2. Provide Bacnet interface for BMS system interface. BMS shall monitor the following points:

a. Total Flow

3. Acceptable Manufacture:

a. Badger Meters, Recodall
b. Or approved equal

2.7 THERMOSTATS

A. Manufacturers:

1. Erie Controls.
2. Danfoss Inc.; Air-Conditioning and Refrigeration Div.
3. Heat-Timer Corporation.
4. Sauter Controls Corporation.
5. tekmar Control Systems, Inc.
6. Theben AG - Lumilite Control Technology, Inc.

B. Thermistor Temperature Sensor

1. Prerential rate control to minimize overshoot and deviation from setpoint.
2. Short-cycle protection.
3. Sensor operating temperature From 32°F to 122°F (0°C to 50°C)
4. Storage temperature From -40°F to 185°F (-40°C to 85°C)
5. Storage/operating humidity range 5% to 95% relative humidity (RH), noncondensing
6. Thermistor accuracy 0.36°F at calibration point, 1%
7. Setpoint functional range 45°F to 90°F (7.2°C to 32.2°C)
8. Setpoint thumbwheel markings
9. 50°F to 85°F (in 5°F increments) with */** icons on thumbwheel
10. 11°C to 29°C (in 3°C increments) with */** icons on thumbwheel
11. Housing material Polycarbonate/ABS (suitable for plenum mounting), UV protection, UL 94: 5 VA flammability rating.
12. Local Ethernet connection.

2.8 HUMIDISTATS

A. Manufacturers:

1. MAMAC Systems, Inc.
2. ROTRONIC Instrument Corp.

B. Duct-Mounting Humidistats: Electric insertion, 2-position type with adjustable, 2 percent throttling range, 20 to 80 percent operating range, and single- or double-pole contacts.

2.9 CO2 SENSOR

A. Manufacturers:
1. Siemens Controls

B. CO2 effectively control C02 levels within a 0-2000 ppm range.

C. Non-Dispersive InfraRed (NDIR) sensor.

D. CO2 sensor shall be equipped with the following options:

1. Accuracy at 25°C ±30 ppm CO2 +3% of reading (includes repeatability)
2. Pressure dependence of output +1.6% of reading per kPa
3. Annual zero drift ±10 ppm
4. Recommended calibration interval None (auto-calibrated)
5. Response time < 3 minutes
6. Operating temperature From 32°F to 122°F (0°C to 50°C)
7. Storage temperature From -40°F to 158°F (-40°C to 70°C)
8. Humidity range 0–85% relative humidity (RH)
9. Airflow range 0–33 ft/s (0–10 m/s)
10. Output signals • OUT1 (V): 0–10 VDC
11. Resolution of analog outputs 2ppm CO2
12. Automatic self-diagnostics Diagnostic tools

2.10 ACTUATORS

A. Electric Motors: Size to operate with sufficient reserve power to provide smooth modulating action or two-position action.

1. Comply with requirements in Division 23 Section "Common Motor Requirements for HVAC Equipment."
2. Permanent Split-Capacitor or Shaded-Pole Type: Gear trains completely oil immersed and sealed. Equip spring-return motors with integral spiral-spring mechanism in housings designed for easy removal for service or adjustment of limit switches, auxiliary switches, or feedback potentiometer.
3. Nonspring-Return Motors for Valves Larger Than NPS 2-1/2: Size for running torque of 150 in. x lbf and breakaway torque of 300 in. x lbf.
4. Spring-Return Motors for Valves Larger Than NPS 2-1/2: Size for running and breakaway torque of 150 in. x lbf.
5. Nonspring-Return Motors for Dampers Larger Than 25 Sq. Ft.: Size for running torque of 150 in. x lbf and breakaway torque of 300 in. x lbf.
6. Spring-Return Motors for Dampers Larger Than 25 Sq. Ft.: Size for running and breakaway torque of 150 in. x lbf.

B. Electronic Actuators: Direct-coupled type designed for minimum 60,000 full-stroke cycles at rated torque.

1. Manufacturers:

   a. Belimo Aircontrols (USA), Inc.

2. Valves: Size for torque required for valve close off at maximum pump differential pressure.

3. Dampers: Size for running torque calculated as follows:

a. Parallel-Blade Damper with Edge Seals: 7 inch-lb/sq. ft. of damper.
b. Opposed-Blade Damper with Edge Seals: 5 inch-lb/sq. ft. of damper.
c. Parallel-Blade Damper without Edge Seals: 4 inch-lb/sq. ft of damper.
d. Opposed-Blade Damper without Edge Seals: 3 inch-lb/sq. ft. of damper.
e. Dampers with 2- to 3-Inch wg of Pressure Drop or Face Velocities of 1000 to 2500 fpm: Increase running torque by 1.5.
f. Dampers with 3- to 4-Inch wg of Pressure Drop or Face Velocities of 2500 to 3000 fpm: Increase running torque by 2.0.

4. Coupling: V-bolt and V-shaped, toothed cradle.
5. Overload Protection: Electronic overload or digital rotation-sensing circuitry.
6. Fail-Safe Operation: Mechanical, spring-return mechanism. Provide external, manual gear release on nonspring-return actuators.
7. Power Requirements (Two-Position Spring Return): 24-V ac.
8. Power Requirements (Modulating): Maximum 10 VA at 24-V ac or 8 W at 24-V dc.
9. Proportional Signal: 2- to 10-V dc or 4 to 20 mA, and 2- to 10-V dc position feedback signal.
10. Temperature Rating: Minus 22 to plus 122 deg F.
11. Temperature Rating (Smoke Dampers): Minus 22 to plus 250 deg F.
12. Run Time: 12 seconds open, 5 seconds closed.
13. Motorized dampers shall not share a common actuator unless the dampers are controlling the same airstream.

2.11 PRESSURE INDEPENDENT CHARACTERIZED CONTROL VALVES

A. Control Valves: Factory fabricated, of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated.

1. Pressure independent characterized ball control valves, Belimo or approved equal, shall be utilized for AHU’s CHW coils and FCU coils.

B. Manufacturer:

1. Belimo (Belimo Energy Valve)
2. Or approved equal.

C. Control Valves: Factory fabricated of type, body material, and pressure class based on maximum pressure and temperature rating of piping system, unless otherwise indicated.

D. The manufacturer shall warrant all components for a period of 5 years from the date of production, with the first two years unconditional (except as noted).

E. Pressure Independent Control Valves 2” and smaller:

1. NPS 2 and Smaller: Forged brass body rated at no less than 360 PSI, stainless steel ball and stem, female NPT union or flanged ends, EPDM lubricated O-rings and TEFZEL characterizing disc.
2. Accuracy: The control valves shall accurately control the flow from 0 to 100% full rated flow with an operating pressure differential range of 5 to 50 PSID across the valve.
3. Flow Characteristics: Equal percentage/linear characteristics. (Ultrasonic flow meter with ± 5% of the actual flow)
4. Close-Off Pressure Rating: 200 PSI.
5. Supply and return temperature sensors with thermowells and pipe fittings.
6. All actuators shall be electronically programmed by use of external computer software for the adjustment of flow. Programming using actuator mounted switches or multi-turn actuators are not acceptable. Actuators shall be provided with an auxiliary switch to prove valve position.
7. The actuator shall be the same manufacturer as the valve, integrally mounted to the valve at the factory with a single screw on a four-way DIN mounting-base.
8. The control valve shall require no maintenance and shall not include replaceable cartridges.
9. The manufacturer shall warrant all components for a period of 5 years from the date of production, with the first two years unconditional.
10. The use of pressure independent valves piped in parallel to achieve the rated coil flow shall be permitted. Actuators shall be electronically programmed to permit sequencing the flow with a single control output point. The use of external devices to permit sequencing is not acceptable.

F. Pressure Independent Control Valves 2-1/2” to 6”:

1. NPS 2-1/2 to 6”: Forged brass body rated at no less than 360 PSI, stainless steel ball and stem, flanged ends, EPDM lubricated O-rings and TEFZEL characterizing disc.
2. Accuracy: The control valves shall accurately control the flow from 0 to 100% full rated flow with an operating pressure differential range of 5 to 50 PSID across the valve.
3. Flow Characteristics: Equal percentage/linear characteristics. (Magnetic flow meter with ± 5% of the actual flow)
4. Close-Off Pressure Rating: 200 PSI.
5. Supply and return temperature sensors with thermowells and pipe fittings.
6. All actuators shall be electronically programmed by use of external computer software for the adjustment of flow. Programming using actuator mounted switches or multi-turn actuators are not acceptable. Actuators shall be provided with an auxiliary switch to prove valve position.
7. The actuator shall be the same manufacturer as the valve, integrally mounted to the valve at the factory with a single screw on a four-way DIN mounting-base.
8. The control valve shall require no maintenance and shall not include replaceable cartridges.
9. The manufacturer shall warrant all components for a period of 5 years from the date of production, with the first two years unconditional.

10. The use of pressure independent valves piped in parallel to achieve the rated coil flow shall be permitted. Actuators shall be electronically programmed to permit sequencing the flow with a single control output point. The use of external devices to permit sequencing is not acceptable.

2.12 CONTROL VALVES

A. Butterfly Valves: 200-psig, 150-psig maximum pressure differential, ASTM A 126 cast-iron or ASTM A 536 ductile-iron body and bonnet, extended neck, stainless-steel stem, field-replaceable EPDM or Buna N sleeve and stem seals.

1. Body Style: Wafer.
2. Disc Type: Aluminum bronze.
3. Sizing: 1-psig maximum pressure drop at design flow rate.
4. Manufacture : Belimo or approved equal.

2.13 DAMPERS

A. Manufacturers:

1. Air Balance Inc.
2. TAMCO (T. A. Morrison & Co. Inc.).
3. United Enertech Corp.
4. Greenheck
5. Ruskin

B. Dampers: AMCA-rated, parallel-blade design; 0.108-inch- minimum thick, galvanized-steel or 0.125-inch- minimum thick, extruded-aluminum frames with holes for duct mounting; damper blades shall not be less than 0.064-inch- thick galvanized steel with maximum blade width of 8 inches and length of 48 inches.

1. Secure blades to 1/2-inch- diameter, zinc-plated axles using zinc-plated hardware, with oil-impregnated sintered bronze blade bearings, blade-linkage hardware of zinc-plated steel and brass, ends sealed against spring-stainless-steel blade bearings, and thrust bearings at each end of every blade.
2. Operating Temperature Range: From minus 40 to plus 200 deg F.
3. Edge Seals, Standard Pressure Applications: Closed-cell neoprene.
4. Edge Seals, Low-Leakage Applications: Use inflatable blade edging or replaceable rubber blade seals and spring-loaded stainless-steel side seals, rated for leakage at less than 10 cfm per sq. ft. of damper area, at differential pressure of 4-inch wg when damper is held by torque of 50 in. x lbf; when tested according to AMCA 500D.
5. Outside, return, relief and exhaust air dampers shall be of low leakage proportional type with spring return and fail closed.

2.14 CONTROL CABLE

A. Electronic and fiber-optic cables for control wiring are specified in Division 27 Section "Communications Horizontal Cabling."

1. Electronic and fiber-optic cables for control wiring shall meet the following low voltage wiring requirements:

a. Input/Output = Green jacket, plenum rated with shield.

1) 18 awg, shielded, plenum rated 2-conductor.
2) Loop powered devices should be implemented using (2) two cables.

b. COMM = BACnet MS/TP Low Cap 100 ohm, 12.5pf/ft Blue jacket plenum rated with shield

1) 24 awg, shielded, plenum rated 2-conductor

c. Power (<50VAC/VDC) = Orange jacket plenum rated with shield
1) 18 awg, shielded, plenum rated 2-conductor

2.15 POWER MONITORING

A. Power Monitor Meters: Provide power monitors sized for the respective load and/or panel being monitored.

1. The BCS shall monitor power usage in "KWH", peak demand “KW”, instaneous power “KW” demand, voltage per phase.
2. Provide UL listed manufactures enclosure for assembly. NEMA 1 indoors, NEMA 3R outdoors.

3. Provide Bacnet interface for BMS system interface. BMS shall monitor the following points at each power monitor location:

a. KW
b. KWH
c. Peak KW
d. Voltage per Phase
e. Current

4. Acceptable Manufacture/Model:

a. Veris Power Meter system (Solid Core or split Core Style) with BACnet interface.

1) Veris E50 for single circuits
2) Veris E60 for MDP or distribution panel mains

b. Or approved equal

2.16 LAB CONTROLS

1. Basis of Design: Antec (Model PACE) (By Price)

a. Or as approved by Owner

2. Input/Output (I/O) Configuration:

a. Digital Outputs:

1) 6 relay outputs SPDT (contact ratings: 5A @ 25OVAC)
2) Removable Screw terminals
3) Individual LED Indication of output status (color - “red’)

b. Universal Inputs:

1) 12 total

2) Input Signals Supported (jumper selectable):

a) Thermistor/Dry Contact.
b) 0-10 VDC (scalable in software for other ranges)
c) 0-20 mA (scalable in software for other ranges)
d) 1K Platinum RTD

3) Removable screw terminals
4) 12-Bit A/D
5) Selectable +5V or +24V voltage source (240 mA max)

c. Universal Outputs:

1) 6 total

2) Analog Output Signals Supported:

a) 0-10 V DC on all 6 outputs (scalable in software for other ranges)
b) 0-10 VDC or 0-20 mA on 2 of the outputs

3) Digital Output Signals - Each of the 6 outputs can be individually configured as digital outputs. They have the signal capacity
4) to drive an external voltage relay device.

5) Removable screw terminals
6) Individual LED Indication (red - vary in intensity based on output signal status)

3. Power Requirements:

a. External Power Source - 24 VAC ± 15 %, 50-60 Hz, 20 VA.
b. Removable screw terminal (2-position) for power connection
c. LED Indication: Power (green), Run (green), and Error (red) LEDs

4. Communication Ports:

a. 4Ports

1) Open Protocol Port #1 - EIA-232/485/ARC 156 (jumper selectable)
2) Open Protocol Port #2 - Plug-in port for optional communications cards (LonWorks, Ethernet, Modem, etc.). Note: use of this plug-in port disables serial (232/485) communications at Port #1; however, ARC 156 communications may be active simultaneous to Port #2 usage.
3) Rnet Port - for connection to keypad/displays and/or intelligent sensors. This port also acts as the local laptop access port.
4) I/O Expansion Port (CAN-bus)

b. Removable Screw terminals
c. Transmit & Receive LEDs for each port
d. Rotary Address Switches
e. Protocol & Baud Rate selector DIP switch
f. Integrate to Fume hood autosash controller.

5. Size and Environmental Requirements:

a. Board Size (including metal cover): 11-3/4” wide x 5” high x 2” deep
b. Expander Board Size: 10-5/8” wide x 3” high x 2” deep (note: the expander boards can be mounted on top of the ENV IV controller to conserve panel space or they can be remotely mounted up to 500 feet away from the controller.)
c. Protection: Brushed aluminum, gull-wing metal
d. Temperature Range: -40 to 150 deg. F, 10-95% RH non-condensing
e. Agency Listings: UL, cUL, CE. FCC

6. Lab Air Control Valves:

a. Lab General Exhaust Valves:

1) Basis of Design (ANTEC VV) or approved equal.
2) Venturi Body and Cone

3) Body Material: Aluminum
4) Cone Material: Aluminum
5) Internal Hardware: 316L Stainless
6) Electronic actuator

b. Lab Hood Exhaust Valves:

1) Basis of Design (ANTEC VV) or approved equal.
2) Venturi Body and Cone
3) Body Material: Aluminum with PVDF Kynar Coating or equivalent
4) Cone Material: Aluminum with PVDF Kynar Coating or equivalent
5) Internal Hardware: 316L Stainless
6) Electronic actuator

c. Supply Air Valves:

1) Basis of Design: (ANTEC VFX with Hydronic Heat where scheduled) or approved equal.
2) Blade style: Precision Damper
3) Material: Aluminum
4) Insulation: Metal Liner double wall construction with closed cell insulation
5) AirFlow Measuring Station: Velocity Wing
6) Damper Shaft: Solid one Piece Shaft
7) Electronic actuator

8) Hydronic Heater:

a) Casing: Minimum 22 ga. galvanized steel.
b) Factory installed.
c) Gasketed access door.
d) Aluminum fins mechanical bonded to seamless copper tubes.
e) AHRI 410 Certified.

d. Refer to Design Drawings for Performance requirements.

7. See Fume hood specification for autosash controller being supplied with the Fume hoods. Fume hood controller shall be integrated with the Lab Controller to provide seamless operation between the two controller systems.

a. Fume Hood Controllers shall provide the following operation:

1) Occupancy Sensor at each hood.
2) Sash position at each hood.
3) Auto Sash actuator at each hood.
4) Sash obstruction sensor at each hood sash edge.

5) Hood airflow monitor, local digital indication, greenlight normal, redlight low flow, local low flow audible alarm, alarm silence (with adjustable silence time delay).
6) Exit door Pushbutton at each exit door, programmed to reduce the lab exhaust airflows to allow for safe egress for 20 sec (adjustable), then return to exhaust airflow control.

8. Lab Control system shall provide Automatic Airlfow tracking between lab exhaust and associated supply air, to perform the following:

a. Maintain the associated lab minimum air change rates when in occupied or unoccupied modes. (4 AC when unoccupied, minimum 10 AC when occupied. Adjustable.)
b. Maintain the associated exhaust airflow tracking to maintain the lab negative cfm offset at all times. (To ensure lab is negative to adjacent occupied spaces at all times.
c. Modulate fume hood exhaust airflows, based upon associated sash position.
d. Automatically open and close hood sash’s based upon occupancy sensors.
e. Provide local over-ride pushbutton of auto-sash control (with adjustable over-ride timer)
f. Modulate and reduce hood airflows when hood is closed, to code allowed minimums.
g. Modulate lab Air valves to scheduled values.
h. Modulate reheat to maintain space temperature set-points. Reheat shall be controlled to maintain a discharge air temperature set-point which is to be reset upon the space temperature set-point and associated space temperature reading.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Verify that power supply is available to control units and operator workstation.

3.2 INSTALLATION

A. Building Automation controllers can be organized into a hierarchy structure that allows for multiple IP addresses.

1. The only devices allowed at the IP level shall be those that meet or exceed the minimum BIBB requirements of the latest BTL listed B-BC class PICS.
2. All other devices must reside at a lower tier.

3. Any device that is dependent on another device for emergency operation, life safety, etc. must have a means of a direct I/O for the needed points.
4. All installations shall utilize one controller for each piece of equipment or system. Two AHU's cannot share a common controller. However, two pumps for a chilled water system can utilize a common controller.

B. The following framework shall be utilized for device addressing (DEVICE Instance) and network number:

1. Network number shall be comprised of 3 digit building number (551) followed by 2 digit network number. IP level devices shall be assigned a network number of 1.

2. The device ID shall be comprised of the 3 digit building number (551) followed by 2 digit network number (IP devices use 00) followed by 2 digit device number.

a. EXAMPLE: BLDG (XXX)

1) Devices on the IP level: xxx0001-xxx009
2) MSTP assignable network numbers: Xxx01-xxx99

3) MSTP assignable devices: xxx0101-xxx0199 for network xxx01

a) xxx0201-xxx0299 for network xxx02
b) xxx0301-xxx0399 for network xxx03continuing to
c) xxx9901-xxx9999 for network xxx99

4) MS/TP physical address shall be set to match the last 2-digits of the device ID
5) Building Numbers greater than 418 will be assigned an owner specified unique 3-digit number.

C. Install software in control units and operator workstation(s). Implement all features of programs to specified requirements and as appropriate to sequence of operation.

D. Connect and configure equipment and software to achieve sequence of operation specified.

E. Verify location of thermostats, humidistats, and other exposed control sensors with Drawings and room details before installation. Install devices 48 inches above the floor.

1. Install averaging elements in ducts and plenums in crossing or zigzag pattern.

F. Install automatic dampers according to Division 23 Section "Air Duct Accessories."

G. Install damper motors on outside of duct in warm areas, not in locations exposed to outdoor temperatures.

H. Install labels and nameplates to identify control components according to Division 23 Section "Identification for HVAC Piping and Equipment."

I. Install hydronic instrument wells, valves, and other accessories according to Division 23 Section "Hydronic Piping."

J. Install duct volume-control dampers according to Division 23 Sections specifying air ducts.

K. Install electronic and fiber-optic cables according to Division 27 Section "Communications Horizontal Cabling."

3.3 ELECTRICAL WIRING AND CONNECTION INSTALLATION

A. Install raceways, boxes, and cabinets according to Division 26 Section "Raceway and Boxes for Electrical Systems."

1. Controls power shall be connected to emergency power system. A UPS shall be provided for the operator workstation and any file serves, with a minimum of 30 minute capacity.

a. Note: Terminal units with electric heat are not to be supplied with emergency power unless noted otherwise. (Therefore those controls will not be on emergency power, as the equipment is single point power connection.)
b. Note: FCU’s units are not to be supplied with emergency power unless noted otherwise. (Therefore those controls will not be on emergency power, as the equipment is single point power connection.)

B. Install building wire and cable according to Division 26 Section "Low-Voltage Electrical Power Conductors and Cables."

C. Install signal and communication cable according to Division 27 Section "Communications Horizontal Cabling."

1. Conceal cable, except in mechanical rooms and areas where other conduit and piping are exposed.
2. Install exposed cable in raceway.
3. Install concealed cable in raceway.
4. Bundle and harness multiconductor instrument cable in place of single cables where several cables follow a common path.
5. Fasten flexible conductors, bridging cabinets and doors, along hinge side; protect against abrasion. Tie and support conductors.
6. Number-code or color-code conductors for future identification and service of control system, except local individual room control cables.

7. Install wire and cable with sufficient slack and flexible connections to allow for vibration of piping and equipment.

D. Connect manual-reset limit controls independent of manual-control switch positions. Automatic duct heater resets may be connected in interlock circuit of power controllers.

E. Connect hand-off-auto selector switches to override automatic interlock controls when switch is in hand position.

3.4 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust field-assembled components and equipment installation, including connections, and to assist in field testing. Report results in writing.

B. Perform the following field tests and inspections and prepare test reports:

1. Operational Test: After electrical circuitry has been energized, start units to confirm proper unit operation. Remove and replace malfunctioning units and retest.
2. Test and adjust controls and safeties.
3. Test calibration of electronic controllers by disconnecting input sensors and stimulating operation with compatible signal generator.
4. Test each point through its full operating range to verify that safety and operating control set points are as required.
5. Test each control loop to verify stable mode of operation and compliance with sequence of operation. Adjust PID actions.
6. Test each system for compliance with sequence of operation.
7. Test software and hardware interlocks.

C. BAS Verification:

1. Verify that instruments are installed before calibration, testing, and loop or leak checks.
2. Check instruments for proper location and accessibility.
3. Check instrument installation for direction of flow, elevation, orientation, insertion depth, and other applicable considerations.
4. Check instrument tubing for proper fittings, slope, material, and support.
5. Check installation of air supply for each instrument.
6. Check flow instruments. Inspect tag number and line and bore size, and verify that inlet side is identified and that meters are installed correctly.
7. Check pressure instruments, piping slope, installation of valve manifold, and self-contained pressure regulators.
8. Check temperature instruments and material and length of sensing elements.
9. Check control valves. Verify that they are in correct direction.

10. Check BAS system as follows:

a. Verify that BAS controller power supply is from emergency power supply, if applicable.
b. Verify that wires at control panels are tagged with their service designation and approved tagging system.
c. Verify that spare I/O capacity has been provided.
d. Verify that BAS controllers are protected from power supply surges.

D. Replace damaged or malfunctioning controls and equipment and repeat testing procedures.

E. System verification: HVAC Controls: Refer to 230010-3.6 for additional requirements.

3.5 ADJUSTING

A. Calibrating and Adjusting:

1. Calibrate instruments.
2. Make three-point calibration test for both linearity and accuracy for each analog instrument.
3. Calibrate equipment and procedures using manufacturer's written recommendations and instruction manuals. Use test equipment with accuracy at least double that of instrument being calibrated.

4. Control System Inputs and Outputs:

a. Check analog inputs at 0, 50, and 100 percent of span.
b. Check analog outputs using milliampere meter at 0, 50, and 100 percent output.
c. Check digital inputs using jumper wire.
d. Check digital outputs using ohmmeter to test for contact making or breaking.
e. Check resistance temperature inputs at 0, 50, and 100 percent of span using a precision-resistant source.

5. Flow:

a. Set differential pressure flow transmitters for 0 and 100 percent values with 3-point calibration accomplished at 50, 90, and 100 percent of span.
b. Manually operate flow switches to verify that they make or break contact.

6. Pressure:

a. Calibrate pressure transmitters at 0, 50, and 100 percent of span.
b. Calibrate pressure switches to make or break contacts, with adjustable differential set at minimum.

7. Temperature:

a. Calibrate resistance temperature transmitters at 0, 50, and 100 percent of span using a precision-resistance source.
b. Calibrate temperature switches to make or break contacts.

8. Stroke and adjust control valves and dampers without positioners, following the manufacturer's recommended procedure, so that valve or damper is 100 percent open and closed.
9. Stroke and adjust control valves and dampers with positioners, following manufacturer's recommended procedure, so that valve and damper is 0, 50, and 100 percent closed.
10. Provide diagnostic and test instruments for calibration and adjustment of system.
11. Provide written description of procedures and equipment for calibrating each type of instrument. Submit procedures review and approval before initiating startup procedures.
12. Refer to 230010-3.6 for additional calibration and adjustment requirements associated with prefunctional and functional testing.

B. Adjust initial temperature and humidity set points.

C. Occupancy Adjustments: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other than normal occupancy hours for this purpose.

3.6 PROCEDURE FOR HYDRONIC SYSTEMS

A. Equipment installed with pressure independent control valves shall not require hydronic balancing. (Equipment hydronic performance criteria is still required to be measured and documented for all equipment). Flow shall be verified and adjusted for the pressure independent valve assembly for field conditions using the pressure independent control valve manufacturer’s documented procedure for 25% of the total installed product. Exact locations of tested product to be coordinated with the commissioning agent.

3.7 MEASUREMENT & VERIFICATION

A. The following building systems will be measured and trended through the building automation. The contractor shall provide all necessary measuring devices and programming to accomplish the monitoring and trending of these systems. The monitoring and trending shall be polled every 5 minutes at a minimum.

1. Common area lighting systems shall be monitored with check meters at each lighting power panel at each floor.
2. Site lighting system is provided with check meters at the lighting power panel.

3. HVAC systems are provided with check meters at the each power panel at each floor.
4. Major motor loads are also trended through the BAS DDC. The hours of operation are recorded and the total power used is calculated by multiplying the operating hours by the measured brake horsepower noted in the commissioning and testing/balancing reports.
5. VAV box heaters are provided with check meters at the power panel at each floor. VAV box heaters are also trended through the BAS DDC system for operation and discharge air temperature to compare to the anticipated operation model.
6. VFD operation is trended through the BAS DDC as a percentage of full operation. At each unit with a VFD, the motor brake HP is recorded in the commissioning and testing/balancing reports. The energy reduction is calculated by multiplying the percentage of operation trend by the full load power.
7. Building cooling load is monitored through the BAS DDC through the building's BTU meter that will be provided. BTU meter will monitor flow in, by-pass flow, supply water temperature and return water temperatures.
8. Building cooling load will be trended through the BAS DDC for airside and waterside. The outside air temperatures and AHU discharge temperatures are recorded to document cooling loads within the building. The BTU meter information is trended to document cooling loads, also.
9. Building outside air is trended through the BAS DDC for outside air conditioning reductions. The outside air temperature/humidity, leaving ERU outside air temperature/humidity, stale air temperature/humidity and leaving ERU stale air temperature/humidity are all trended. Outside air flow and stale airflow are also trended. The airside BTU meter information is trended to document cooling/heating loads, also.
10. Hot water heating requires trending through the BAS system.
11. Domestic Water use is recorded by the main building water meter and trended by the BAS DDC system.
12. Reclaimed Water use is recorded by the reclaimed water meter to the building's plumbing system by the BAS DDC system.

3.8 DEMONSTRATION AND TRAINING

A. Provide 32 hours of instruction to be conducted at the project site with manufacturer's representative. The training shall be conducted at 4 sessions at 8 hour a piece. Contractor to also provide two sets of control operation manuals for use at the training session and then provide to the Owner after completion of the session.

3.9 COMMISSIONING

A. Refer to Commissioning Specifications, Section 018110, for related commissioning requirements.

B. Contractor shall provide all necessary support to the commissioning team to implement commissioning plan as outlined in Section 018110.

END OF SECTION 23 09 00

SECTION 23 31 13 - METAL DUCTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Single-wall rectangular ducts and fittings.
2. Double-wall rectangular ducts and fittings.
3. Single-wall round and flat-oval ducts and fittings.
4. Double-wall round and flat-oval ducts and fittings.
5. Sheet metal materials.
6. Duct liner.
7. Sealants and gaskets.
8. Hangers and supports.

B. Related Sections:

1. Section 230010 “Basic Mechanical Requirements”.
2. Section 230593 "Testing, Adjusting, and Balancing for HVAC" for testing, adjusting, and balancing requirements for metal ducts.
3. Section 230700 “HVAC Insulation”
4. Section 233300 "Air Duct Accessories" for dampers, sound-control devices, duct-mounting access doors and panels, turning vanes, and flexible ducts.

PERFORMANCE REQUIREMENTS

C. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of the following products:

1. Liners and adhesives.

2. Sealants and gaskets.

B. Shop Drawings:

1. Fabrication, assembly, and installation, including plans, elevations, sections, components, and attachments to other work.
2. Factory- and shop-fabricated ducts and fittings.
3. Duct layout indicating sizes, configuration, liner material, and static-pressure classes.
4. Elevation of top of ducts.
5. Dimensions of main duct runs from building grid lines.
6. Fittings.
7. Reinforcement and spacing.
8. Seam and joint construction.
9. Penetrations through fire-rated and other partitions.
10. Equipment installation based on equipment being used on Project.
11. Locations for duct accessories, including dampers, turning vanes, and access doors and panels.
12. Hangers and supports, including methods for duct and building attachment and vibration isolation.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Duct installation, indicating coordination with general construction, building components, and other building services. Indicate proposed changes to duct layout.
2. Suspended ceiling components.
3. Structural members to which duct will be attached.
4. Size and location of initial access modules for acoustical tile.
5. Penetrations of smoke barriers and fire-rated construction.

6. Items penetrating finished ceiling including the following:

a. Lighting fixtures.
b. Air outlets and inlets.
c. Speakers.
d. Sprinklers.
e. Access panels.
f. Perimeter moldings.

7. Refer to 230010

B. Welding certificates.

C. Field quality-control reports.

D. Duct Leakage Test Plan, Testing Forms, and evidence of each test being completed prior to scheduling verification with Valencia.

1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for hangers and supports. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum," for aluminum supports. AWS D9.1M/D9.1, "Sheet Metal Welding Code," for duct joint and seam welding.

B. ASHRAE/IESNA Compliance: Applicable requirements in ASHRAE/IESNA 90.1, Section 6.4.4 - "HVAC System Construction and Insulation."

PART 2 - PRODUCTS

2.1 SINGLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

B. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

C. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Elbows, Transitions, Offsets, Branch Connections, and Other Duct Construction: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Fittings and Other Construction," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.2 DOUBLE-WALL RECTANGULAR DUCTS AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. McGill AirFlow LLC.
2. Sheet Metal Connectors, Inc.
3. Pre-approved equal to above manufacturers' products.

B. Rectangular Ducts: Fabricate ducts with indicated dimensions for the inner duct.

C. Outer Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" based on indicated static-pressure class unless otherwise indicated.

D. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

E. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

F. Interstitial Insulation: Fibrous-glass liner complying with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

1. Maximum Thermal Conductivity: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
2. Install spacers that position the inner duct at uniform distance from outer duct without compressing insulation.
3. Coat insulation with antimicrobial coating.
4. Cover insulation with polyester film complying with UL 181, Class 1.

G. Inner Duct (acoustical applications): Minimum 0.028-inch perforated galvanized sheet steel having 3/32-inch-diameter perforations, with overall open area of 23 percent.

H. Inner Duct (exposed non-acoustical applications): Minimum 0.028-inch solid sheet steel.

I. Formed-on Transverse Joints (Flanges): Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-1, "Rectangular Duct/Traverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

J. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 2-2, "Rectangular Duct/Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.3 SINGLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS

A. General Fabrication Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on indicated static-pressure class unless otherwise indicated.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Lindab Inc.
b. McGill AirFlow LLC.
c. SEMCO Incorporated.
d. Pre-approved equal to above manufacturer’s products

B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension).

C. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Transverse Joints in Ducts Larger Than 48Inches in Diameter: Flanged.

D. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

1. Fabricate round ducts larger than 72inches in diameter with butt-welded longitudinal seams.
2. Fabricate flat-oval ducts larger than 48inches in width (major dimension) with butt-welded longitudinal seams.

E. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

2.4 DOUBLE-WALL ROUND AND FLAT-OVAL DUCTS AND FITTINGS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Lindab Inc.
2. McGill AirFlow LLC.
3. SEMCO Incorporated.
4. Pre-approved equal to above manufacturer’s products

B. Flat-Oval Ducts: Indicated dimensions are the duct width (major dimension) and diameter of the round sides connecting the flat portions of the duct (minor dimension) of the inner duct.

C. Outer Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 3, "Round, Oval, and Flexible Duct," based on static-pressure class unless otherwise indicated.

1. Transverse Joints: Select joint types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-1, "Round Duct Transverse Joints," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

a. Transverse Joints in Ducts Larger Than 48Inches in Diameter: Flanged.

2. Longitudinal Seams: Select seam types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-2, "Round Duct Longitudinal Seams," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

a. Fabricate round ducts larger than 72inches in diameter with butt-welded longitudinal seams.
b. Fabricate flat-oval ducts larger than 48inches in width (major dimension) with butt-welded longitudinal seams.

3. Tees and Laterals: Select types and fabricate according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees," for static-pressure class, applicable sealing requirements, materials involved, duct-support intervals, and other provisions in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible."

D. Interstitial Insulation: Fibrous-glass liner complying with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

1. Maximum Thermal Conductivity: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
2. Install spacers that position the inner duct at uniform distance from outer duct without compressing insulation.
3. Coat insulation with antimicrobial coating.
4. Cover insulation with polyester film complying with UL 181, Class 1.

E. Inner Duct (acoustical applications): Minimum 0.028-inch perforated galvanized sheet steel having 3/32-inch-diameter perforations, with overall open area of 23 percent.

F. Inner Duct (exposed non-acoustical applications): Minimum 0.028-inch solid sheet steel.

2.5 SHEET METAL MATERIALS

A. General Material Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

B. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G90.
2. Finishes for Surfaces Exposed to View: Mill phosphatized.

C. PVC-Coated, Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G90.
2. Minimum Thickness for Factory-Applied PVC Coating: 4 mils thick on sheet metal surface of ducts and fittings, inside and outside surfaces.
3. Coating Materials: Acceptable to authorities having jurisdiction for use on ducts listed and labeled by an NRTL for compliance with UL 181, Class 1.

D. Carbon-Steel Sheets: Comply with ASTM A 1008/A 1008M, with oiled, matte finish for exposed ducts.

E. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304 or 316, as indicated in the "Duct Schedule" Article; cold rolled, annealed, sheet. Exposed surface finish shall be No. 2B, No. 2D, No. 3, or No. 4 as indicated in the "Duct Schedule" Article.

F. Aluminum Sheets: Comply with ASTM B 209 Alloy 3003, H14 temper; with mill finish for concealed ducts, and standard, one-side bright finish for duct surfaces exposed to view.

G. Factory- or Shop-Applied Antimicrobial Coating:

1. Apply to the surface of sheet metal that will form the interior surface of the duct. An untreated clear coating shall be applied to the exterior surface.
2. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.
3. Coating containing the antimicrobial compound shall have a hardness of 2H, minimum, when tested according to ASTM D 3363.
4. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.
5. Shop-Applied Coating Color: White.
6. Antimicrobial coating on sheet metal is not required for duct containing liner treated with antimicrobial coating.

H. Reinforcement Shapes and Plates: ASTM A 36/A 36M, steel plates, shapes, and bars; black and galvanized.

1. Where black- and galvanized-steel shapes and plates are used to reinforce aluminum ducts, isolate the different metals with butyl rubber, neoprene, or EPDM gasket materials.

I. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.6 DUCT LINER

A. Fibrous-Glass Duct Liner: Comply with ASTM C 1071, NFPA 90A, or NFPA 90B; and with NAIMA AH124, "Fibrous Glass Duct Liner Standard."

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. CertainTeed Corporation; Insulation Group.
b. Johns Manville.
c. Knauf Insulation.
d. Owens Corning.

e. Maximum Thermal Conductivity:

1) Type I, Flexible: 0.27 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.
2) Type II, Rigid: 0.23 Btu x in./h x sq. ft. x deg F at 75 deg F mean temperature.

2. Antimicrobial Erosion-Resistant Coating: Apply to the surface of the liner that will form the interior surface of the duct to act as a moisture repellent and erosion-

resistant coating. Antimicrobial compound shall be tested for efficacy by an NRTL and registered by the EPA for use in HVAC systems.

3. Water-Based Liner Adhesive: Comply with NFPA 90A or NFPA 90B and with ASTM C 916.

   a. For indoor applications, adhesive shall have a VOC content of 80 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Flexible Elastomeric Duct Liner: Preformed, cellular, closed-cell, sheet materials complying with ASTM C 534, Type II, Grade 1; and with NFPA 90A or NFPA 90B.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Aeroflex USA Inc.
   b. Armacell LLC.
   c. Rubatex International, LLC

2. Surface-Burning Characteristics: Maximum flame-spread index of 25 and maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

3. Liner Adhesive: As recommended by insulation manufacturer and complying with NFPA 90A or NFPA 90B.

   a. For indoor applications, adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

C. Insulation Pins and Washers:

1. Cupped-Head, Capacitor-Discharge-Weld Pins: Copper- or zinc-coated steel pin, fully annealed for capacitor-discharge welding, 0.135-inch diameter shank, length to suit depth of insulation indicated with integral 1-1/2-inch galvanized carbon-steel washer.
2. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch-thick galvanized steel, aluminum, or stainless steel; with beveled edge sized as required to hold insulation securely in place but not less than 1-1/2 inches in diameter.

D. Shop Application of Duct Liner: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 7-11, "Flexible Duct Liner Installation."

1. Adhere a single layer of indicated thickness of duct liner with at least 90 percent adhesive coverage at liner contact surface area. Attaining indicated thickness with multiple layers of duct liner is prohibited.
2. Apply adhesive to transverse edges of liner facing upstream that do not receive metal nosing.

3. Butt transverse joints without gaps, and coat joint with adhesive.
4. Fold and compress liner in corners of rectangular ducts or cut and fit to ensure butted-edge overlapping.
5. Do not apply liner in rectangular ducts with longitudinal joints, except at corners of ducts, unless duct size and dimensions of standard liner make longitudinal joints necessary.
6. Apply adhesive coating on longitudinal seams.
7. Secure liner with mechanical fasteners 4 inches from corners and at intervals not exceeding 12 inches transversely; at 3 inches from transverse joints and at intervals not exceeding 18 inches longitudinally.

8. Secure transversely oriented liner edges facing the airstream with metal nosings that have either channel or "Z" profiles or are integrally formed from duct wall. Fabricate edge facings at the following locations:

   a. Fan discharges.
   b. Intervals of lined duct preceding unlined duct.
   c. Upstream edges of transverse joints in ducts where air velocities are higher than 1000 fpm or where indicated.

9. Terminate inner ducts with buildouts attached to fire-damper sleeves, dampers, turning vane assemblies, or other devices. Fabricated buildouts (metal hat sections) or other buildout means are optional; when used, secure buildouts to duct walls with bolts, screws, rivets, or welds.

2.7 SEALANT AND GASKETS

A. General Sealant and Gasket Requirements: Surface-burning characteristics for sealants and gaskets shall be a maximum flame-spread index of 25 and a maximum smoke-developed index of 50 when tested according to UL 723; certified by an NRTL.

B. Water-Based Joint and Seam Sealant:

1. Application Method: Brush on.
2. Solids Content: Minimum 65 percent.
3. Shore A Hardness: Minimum 20.
4. Water resistant.
5. Mold and mildew resistant.
6. VOC: Maximum 75 g/L (less water).
7. Maximum Static-Pressure Class: 10-inch wg, positive and negative.
8. Service: Indoor or outdoor.
9. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

C. Solvent-Based Joint and Seam Sealant (for use outdoors only):

1. Application Method: Brush on.

2. Base: Synthetic rubber resin.
3. Solvent: Toluene and heptane.
4. Solids Content: Minimum 60 percent.
5. Shore A Hardness: Minimum 60.
6. Water resistant.
7. Mold and mildew resistant.
8. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
9. VOC: Maximum 395 g/L.
10. Maximum Static-Pressure Class: 10-inch wg, positive or negative.
11. Service: Outdoor.
12. Substrate: Compatible with galvanized sheet steel (both PVC coated and bare), stainless steel, or aluminum sheets.

D. Flanged Joint Sealant: Comply with ASTM C 920.

1. General: Single-component, acid-curing, silicone, elastomeric.
2. Type: S.
3. Grade: NS.
4. Class: 25.
5. Use: O.
6. For indoor applications, sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

E. Flange Gaskets: Butyl rubber, neoprene, or EPDM polymer with polyisobutylene plasticizer.

F. Round Duct Joint O-Ring Seals:

1. Seal shall provide maximum 3 cfm/100 sq. ft. at 1-inch wg and shall be rated for10-inch wg static-pressure class, positive or negative.
2. EPDM O-ring to seal in concave bead in coupling or fitting spigot.
3. Double-lipped, EPDM O-ring seal, mechanically fastened to factory-fabricated couplings and fitting spigots.

2.8 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Strap and Rod Sizes: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct."

D. Steel Cables for Galvanized-Steel Ducts: Galvanized steel complying with ASTM A 603.

E. Steel Cables for Stainless-Steel Ducts: Stainless steel complying with ASTM A 492.

F. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

G. Duct Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

H. Trapeze and Riser Supports:
   1. Supports for Galvanized-Steel Ducts: Galvanized-steel shapes and plates.
   2. Supports for Stainless-Steel Ducts: Stainless-steel shapes and plates.
   3. Supports for Aluminum Ducts: Aluminum or galvanized steel coated with zinc chromate.

2.9 RESTRAINT DEVICES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   1. Cooper B-Line, Inc.; a division of Cooper Industries.
   2. Ductmate Industries, Inc.
   3. Hilti Corp.
   4. Kinetics Noise Control.
   5. Loos & Co.; Cableware Division.
   6. Mason Industries.
   7. TOLCO; a brand of NIBCO INC.
   8. Unistrut Corporation; Tyco International, Ltd.

B. Channel Support System: Shop- or field-fabricated support assembly made of slotted steel channels rated in tension, compression, and torsion forces and with accessories for attachment to braced component at one end and to building structure at the other end. Include matching components and corrosion-resistant coating.

C. Restraint Cables: ASTM A 603, galvanized or ASTM A 492, stainless-steel cables with end connections made of cadmium-plated steel assemblies with brackets, swivel, and bolts designed for restraining cable service; and with an automatic-locking and clamping device or double-cable clips.

D. Mechanical Anchor Bolts: Drilled-in and stud-wedge or female-wedge type. Select anchor bolts with strength required for anchor and as tested according to ASTM E 488.

PART 3 - EXECUTION

3.1 DUCT INSTALLATION

A. Drawing plans, schematics, and diagrams indicate general location and arrangement of duct system. Indicated duct locations, configurations, and arrangements were used to size ducts and calculate friction loss for air-handling equipment sizing and for other design considerations. Install duct systems as indicated unless deviations to layout are approved on Shop Drawings and Coordination Drawings.

B. Install ducts according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" unless otherwise indicated.

C. Install round and flat-oval ducts in maximum practical lengths.

D. Install ducts with fewest possible joints.

E. Install factory- or shop-fabricated fittings for changes in direction, size, and shape and for branch connections.

F. Unless otherwise indicated, install ducts vertically and horizontally, and parallel and perpendicular to building lines.

G. Install ducts close to walls, overhead construction, columns, and other structural and permanent enclosure elements of building.

H. Install ducts with a clearance of 1 inch, plus allowance for insulation thickness.

I. Route ducts to avoid passing through transformer vaults and electrical equipment rooms and enclosures.

J. Ducts located on the roof, shall have a pitched top to shed water, rain, and snow.

K. Where ducts pass through non-fire-rated interior partitions and exterior walls and are exposed to view, cover the opening between the partition and duct or duct insulation with sheet metal flanges of same metal thickness as the duct. Overlap openings on four sides by at least 1-1/2 inches.

L. Where ducts pass through fire-rated interior partitions and/or exterior walls, install fire dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers.

M. Where ducts pass through fire/smoke-rated interior partitions and/or exterior walls, install combination fire dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers. Install a duct mount smoke detector within 5’ of the damper for activation.

N. Where ducts pass through smoke-rated interior partitions and/or exterior walls, install smoke dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for smoke dampers. Install a duct mount smoke detector within 5’ of the smoke damper for activation.

O. Where ducts connect to 2-hr shafts, install combination fire smoke dampers. Comply with requirements in Section 233300 "Air Duct Accessories" for fire and smoke dampers. Install a duct mount smoke detector within 5’ of the CFS damper for activation.

P. Protect duct interiors from moisture, construction debris and dust, and other foreign materials. Comply with SMACNA's "IAQ Guidelines for Occupied Buildings Under Construction," Appendix G, "Duct Cleanliness for New Construction Guidelines."

3.2 INSTALLATION OF EXPOSED DUCTWORK

A. Protect ducts exposed in finished spaces from being dented, scratched, or damaged.

B. Trim duct sealants flush with metal. Create a smooth and uniform exposed bead. Do not use two-part tape sealing system.

C. Grind welds to provide smooth surface free of burrs, sharp edges, and weld splatter. When welding stainless steel with a No. 3 or 4 finish, grind the welds flush, polish the exposed welds, and treat the welds to remove discoloration caused by welding.

D. Maintain consistency, symmetry, and uniformity in the arrangement and fabrication of fittings, hangers and supports, duct accessories, and air outlets.

E. Repair or replace damaged sections and finished work that does not comply with these requirements.

3.3 ADDITIONAL INSTALLATION REQUIREMENTS FOR COMMERCIAL KITCHEN HOOD EXHAUST DUCT

A. Install commercial kitchen hood exhaust ducts without dips and traps that may hold grease, and sloped a minimum of 2 percent to drain grease back to the hood.

B. Install fire-rated access panel assemblies at each change in direction and at maximum intervals of 20 feet in horizontal ducts, and at every floor for vertical ducts, or as indicated on Drawings. Locate access panel on top or sides of duct a minimum of 1-1/2 inches from bottom of duct.

C. Do not penetrate fire-rated assemblies except as allowed by applicable building codes and authorities having jurisdiction.

D. Install 2-hr listed duct fire wrap to allow zero clearance to combustibles, from hood to out of building in accordance with NFPA 96.

E. Install in accordance with IBC and NFPA 96.

3.4 DUCT SEALING

A. Seal ducts for duct static-pressure, seal classes, and leakage classes specified in "Duct Schedule" Article according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible." Seal all ducts and all joints, regardless of pressure/seal class.

3.5 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 5, "Hangers and Supports."

B. Building Attachments: (Contractor shall coordinate with structural drawings prior to installation and layout.) Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes or for slabs more than 4 inches thick.
4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes or for slabs less than 4 inches thick.
5. If building is Post-Tension, Contractor shall x-ray prior to installing anchors, and coordinate anchor locations with x-rays and structural drawings.
6. Proposed hanger and support layout/spacing shall not exceed building structural limitations at each reaction/support location. Contractor shall provide additional supports as required to anchor and support in accordance with building design structural limits.

C. Hanger Spacing: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 5-1, "Rectangular Duct Hangers Minimum Size," and Table 5-2, "Minimum Hanger Sizes for Round Duct," for maximum hanger spacing; install hangers and supports within 24 inches of each elbow and within 48 inches of each branch intersection.

D. Hangers Exposed to View: Threaded rod and angle or channel supports.

E. Support vertical ducts with steel angles or channel secured to the sides of the duct with welds, bolts, sheet metal screws, or blind rivets; support at each floor and at a maximum intervals of 16 feet.

F. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.6 RESTRAINT-DEVICE INSTALLATION

A. Select restraint devices with capacities adequate to carry present and future static and dynamic loads.

B. Install cables so they do not bend across edges of adjacent equipment or building structure.

C. Install cable restraints on ducts that are suspended with vibration isolators.

D. Attachment to Structure: If specific attachment is not indicated, anchor bracing and restraints to structure, to flanges of beams, to upper truss chords of bar joists, or to concrete members.

E. Drilling for and Setting Anchors:

1. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Do not damage existing reinforcement or embedded items during drilling. Notify the Architect if reinforcing steel or other embedded items are encountered during drilling. Locate and avoid prestressed tendons, electrical and telecommunications conduit, and gas lines.
2. Do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
3. Wedge Anchors: Protect threads from damage during anchor installation. Heavy-duty sleeve anchors shall be installed with sleeve fully engaged in the structural element to which anchor is to be fastened.
4. Set anchors to manufacturer's recommended torque, using a torque wrench.
5. Install zinc-coated steel anchors for interior applications and stainless-steel anchors for applications exposed to weather.

3.7 CONNECTIONS

A. Make connections to equipment with flexible connectors complying with Section 233300 "Air Duct Accessories."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for branch, outlet and inlet, and terminal unit connections.

3.8 PAINTING

A. Paint interior of metal ducts that are visible through registers and grilles and that do not have duct liner. Apply one coat of flat, black, latex paint over a compatible galvanized-steel primer. Paint materials and application requirements are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

3.9 FIELD QUALITY CONTROL

A. Perform tests and inspections.

B. Leakage Tests:

1. Comply with SMACNA's "HVAC Air Duct Leakage Test Manual." Submit a test report for each test.

2. Test the following systems:

a. Ducts with a Pressure Class 1-Inch wg or higher: Test representative duct sections, selected by Architect from sections installed, totaling no less than 50 percent of total installed duct area for each designated pressure class and each duct system type.
b. Smoke Control Ducts (i.e. Atrium): Test all ducts installed in accordance with FBC.

3. Disassemble, reassemble, and seal segments of systems to accommodate leakage testing and for compliance with test requirements.
4. Test for leaks before applying external insulation.
5. Conduct tests at static pressures equal to maximum design pressure of system or section being tested. If static-pressure classes are not indicated, test system at maximum system design pressure. Do not pressurize systems above maximum design operating pressure.
6. Give seven (7) days' advance notice for testing.
7. Prior to the ductwork being leak and pressure tested, the TAB contractor shall sign off that devices are installed that are needed to properly test and balance the system.
8. Valencia intends to verify the successful completion of all ductwork leakage and pressure testing. The contractor shall be responsible for submitting a testing plan, testing forms, and evidence of each test being successfully completed prior to scheduling verification with Valencia. This shall be repeated for each section of ductwork that requires testing.

C. Duct System Cleanliness Tests:

1. Visually inspect duct system to ensure that no visible contaminants are present.

2. Test sections of metal duct system, chosen randomly by Owner, for cleanliness according to "Vacuum Test" in NADCA ACR, "Assessment, Cleaning and Restoration of HVAC Systems."

    a. Acceptable Cleanliness Level: Net weight of debris collected on the filter media shall not exceed 0.75 mg/100 sq. cm.

D. Duct system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

3.10 DUCT CLEANING

A. Clean new and existing duct system(s) before testing, adjusting, and balancing.

B. Use service openings for entry and inspection.

1. Create new openings and install access panels appropriate for duct static-pressure class if required for cleaning access. Provide insulated panels for insulated or lined duct. Patch insulation and liner as recommended by duct liner manufacturer. Comply with Section 233300 "Air Duct Accessories" for access panels and doors.
2. Disconnect and reconnect flexible ducts as needed for cleaning and inspection.
3. Remove and reinstall ceiling to gain access during the cleaning process.

C. Particulate Collection and Odor Control:

1. When venting vacuuming system inside the building, use HEPA filtration with 99.97 percent collection efficiency for 0.3-micron-size (or larger) particles.
2. When venting vacuuming system to outdoors, use filter to collect debris removed from HVAC system, and locate exhaust downwind and away from air intakes and other points of entry into building.

D. Clean the following components by removing surface contaminants and deposits:

1. Air outlets and inlets (registers, grilles, and diffusers).
2. Supply, return, and exhaust fans including fan housings, plenums (except ceiling supply and return plenums), scrolls, blades or vanes, shafts, baffles, dampers, and drive assemblies.
3. Air-handling unit internal surfaces and components including mixing box, coil section, air wash systems, spray eliminators, condensate drain pans, humidifiers and dehumidifiers, filters and filter sections, and condensate collectors and drains.
4. Coils and related components.
5. Return-air ducts, dampers, actuators, and turning vanes except in ceiling plenums and mechanical equipment rooms.
6. Supply-air ducts, dampers, actuators, and turning vanes.

7. Dedicated exhaust and ventilation components and makeup air systems.

E. Mechanical Cleaning Methodology:

1. Clean metal duct systems using mechanical cleaning methods that extract contaminants from within duct systems and remove contaminants from building.
2. Use vacuum-collection devices that are operated continuously during cleaning. Connect vacuum device to downstream end of duct sections so areas being cleaned are under negative pressure.
3. Use mechanical agitation to dislodge debris adhered to interior duct surfaces without damaging integrity of metal ducts, duct liner, or duct accessories.
4. Clean fibrous-glass duct liner with HEPA vacuuming equipment; do not permit duct liner to get wet. Replace fibrous-glass duct liner that is damaged, deteriorated, or delaminated or that has friable material, mold, or fungus growth.
5. Clean coils and coil drain pans according to NADCA 1992. Keep drain pan operational. Rinse coils with clean water to remove latent residues and cleaning materials; comb and straighten fins.
6. Provide drainage and cleanup for wash-down procedures.
7. Antimicrobial Agents and Coatings: Apply EPA-registered antimicrobial agents if fungus is present. Apply antimicrobial agents according to manufacturer's written instructions after removal of surface deposits and debris.

3.11 START UP

A. Air Balance: Comply with requirements in Section 230593 "Testing, Adjusting, and Balancing for HVAC."

3.12 DUCT SCHEDULE

A. Fabricate ducts with galvanized sheet steel except as otherwise indicated.

B. Supply Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:

   a. Pressure Class: Positive 2-inch wg.
   b. Minimum SMACNA Seal Class: A.

2. Ducts Connected to Constant-Volume Air-Handling Units:

   a. Pressure Class: Positive 2-inch wg.
   b. Minimum SMACNA Seal Class: A.

3. Ducts Connected to Variable-Air-Volume Air-Handling Units (for the first 50 feet) upstream of terminals:

a. Pressure Class: Positive 4-inch wg.
b. Minimum SMACNA Seal Class: A.

4. Ducts Connected to Variable-Air-Volume Air-Handling Units (beyond the first 50 feet) upstream of terminals:

a. Pressure Class: Positive 3-inch wg.
b. Minimum SMACNA Seal Class: A.

C. Return Ducts:

1. Indoor Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: B.

2. Indoor Ducts Connected to Air-Handling Units:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: B.

3. Outdoor Ducts:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: A.

D. Exhaust Ducts:

1. Ducts Connected to Fans Exhausting ASHRAE 62.1, Class 1 and 2 Air:
a. Pressure Class: Negative 2-inch wg.
b. Minimum SMACNA Seal Class: B if negative pressure, and A if positive pressure.

2. Ducts Connected to Commercial Kitchen Hoods: Comply with NFPA 96.

a. Exposed to View: Type 304, stainless-steel sheet, No. 4 finish.
b. Concealed: Type 304, stainless-steel sheet, No. 2D finish.
c. Welded seams and joints.
d. Pressure Class: Positive or negative 3-inch wg.
e. Minimum SMACNA Seal Class: Welded seams, joints, and penetrations.
f. SMACNA Leakage Class: 3.

3. Ducts Connected to Dishwasher Hoods:

a. Type 304, stainless-steel sheet.
b. Exposed to View: No. 4 finish.
c. Concealed: No. 2D finish.

d. Welded seams and flanged joints with watertight EPDM gaskets.
e. Pressure Class: Positive or negative 2-inch wg.
f. Minimum SMACNA Seal Class: Welded seams, joints, and penetrations.
g. SMACNA Leakage Class: 3.

E. Outdoor-Air (Not Filtered, Heated, or Cooled) Ducts:

1. Ducts Connected to Fan Coil Units, Furnaces, Heat Pumps, and Terminal Units:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: A.

2. Ducts Connected to Air-Handling Units:

a. Pressure Class: Positive or negative 2-inch wg.
b. Minimum SMACNA Seal Class: A.

F. Intermediate Reinforcement:

1. Galvanized-Steel Ducts: Galvanized steel.

2. PVC-Coated Ducts:

a. Exposed to Airstream: Match duct material.
b. Not Exposed to Airstream: Match duct material.

3. Stainless-Steel Ducts:

a. Exposed to Airstream: Match duct material.
b. Not Exposed to Airstream: Match duct material.

4. Aluminum Ducts: Aluminum.

G. Liner (Where indicated on Design Drawings):

1. Supply Air Ducts: Fibrous glass, Type I minimum 1 inch thick, and thickness to comply with minimum R-Value.
2. Return Air Ducts Fibrous glass, Type I minimum 1 inch thick, and thickness to comply with minimum R-Value.
3. Exhaust Air Ducts: Fibrous glass, Type I minimum 1 inch thick, and thickness to comply with minimum R-Value.
4. Transfer Ducts: Fibrous glass, Type I 1 inch thick.

H. Double-Wall Duct Interstitial Insulation:

1. Supply/Return/Exhaust Air Ducts: minimum 1-1/2 inchs thick, and thickness to comply with minimum R-4.2.

I. Elbow Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-2, "Rectangular Elbows."

   a. Velocity 1000 fpm or Lower:

      1) Radius Type RE 1 with minimum 0.5 radius-to-diameter ratio.
      2) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

   b. Velocity 1000 to 1500 fpm:

      1) Radius Type RE 1 with minimum 1.0 radius-to-diameter ratio.
      2) Radius Type RE 3 with minimum 0.5 radius-to-diameter ratio and two vanes.
      3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

   c. Velocity 1500 fpm or Higher:

      1) Radius Type RE 1 with minimum 1.5 radius-to-diameter ratio.
      2) Radius Type RE 3 with minimum 1.0 radius-to-diameter ratio and two vanes.
      3) Mitered Type RE 2 with vanes complying with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-3, "Vanes and Vane Runners," and Figure 4-4, "Vane Support in Elbows."

2. Round Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-4, "Round Duct Elbows."

   a. Minimum Radius-to-Diameter Ratio and Elbow Segments: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Table 3-1, "Mitered Elbows." Elbows with less than 90-degree change of direction have proportionately fewer segments.

      1) Velocity 1000 fpm or Lower: 0.5 radius-to-diameter ratio and three segments for 90-degree elbow.
      2) Velocity 1000 to 1500 fpm: 1.0 radius-to-diameter ratio and four segments for 90-degree elbow.
      3) Velocity 1500 fpm or Higher: 1.5 radius-to-diameter ratio and five segments for 90-degree elbow.

b. Round Elbows, 12 Inches and Smaller in Diameter: Stamped or pleated.
c. Round Elbows, 14 Inches and Larger in Diameter: Standing seam or Welded.

J. Branch Configuration:

1. Rectangular Duct: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 4-6, "Branch Connection."

   a. Rectangular Main to Rectangular Branch: 45-degree entry.
   b. Rectangular Main to Round Branch: Conical spin in.

2. Round and Flat Oval: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Figure 3-5, "90 Degree Tees and Laterals," and Figure 3-6, "Conical Tees." Saddle taps are permitted in existing duct.

   a. Velocity up to 1500 fpm: Conical tap.
   b. Velocity 1500 fpm or Higher: 45-degree lateral.

END OF SECTION 23 31 13

SECTION 23 33 00 - AIR DUCT ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Backdraft and pressure relief dampers.
2. Barometric relief dampers.
3. Manual volume dampers.
4. Control dampers.
5. Fire dampers.
6. Ceiling radiation dampers.
7. Smoke dampers.
8. Combination fire and smoke dampers.
9. Corridor dampers.
10. Flange connectors.
11. Duct silencers.
12. Turning vanes.
13. Remote damper operators.
14. Duct-mounted access doors.
15. Flexible connectors.
16. Flexible ducts.
17. Duct security bars.
18. Duct accessory hardware.

B. Related Requirements:

1. Section 233723 "HVAC Gravity Ventilators" for roof-mounted ventilator caps.
2. Section 283111 "Digital, Addressable Fire-Alarm System" for duct-mounted fire and smoke detectors and associated duct mount smoke detector.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. For duct silencers, include pressure drop and dynamic insertion loss data. Include breakout noise calculations for high transmission loss casings.

B. Shop Drawings: For duct accessories. Include plans, elevations, sections, details and attachments to other work.

1. Detail duct accessories fabrication and installation in ducts and other construction. Include dimensions, weights, loads, and required clearances; and method of field assembly into duct systems and other construction. Include the following:

a. Special fittings.
b. Manual volume damper installations.
c. Control-damper installations.
d. Fire-damper, smoke-damper, combination fire- and smoke-damper, ceiling, and corridor damper installations, including sleeves; and duct-mounted access doors and remote damper operators.
e. Duct Access Doors.
f. Support and anchor details.
g. Wiring Diagrams: For power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted access panels and access doors required for access to duct accessories are shown and coordinated with each other, using input from Installers of the items involved

1. Refer to 230010 for additional requirements.

B. Source quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For air duct accessories to include in operation and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Fusible Links: Furnish quantity equal to 10 percent of amount installed.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

A. Comply with NFPA 90A, "Installation of Air Conditioning and Ventilating Systems," and with NFPA 90B, "Installation of Warm Air Heating and Air Conditioning Systems."

B. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for acceptable materials, material thicknesses, and duct construction methods unless otherwise indicated. Sheet metal materials shall be free of pitting, seam marks, roller marks, stains, discolorations, and other imperfections.

2.2 MATERIALS

A. Galvanized Sheet Steel: Comply with ASTM A 653/A 653M.

1. Galvanized Coating Designation: G90.
2. Exposed-Surface Finish: Mill phosphatized.

B. Stainless-Steel Sheets: Comply with ASTM A 480/A 480M, Type 304, and having a No. 2 finish for concealed ducts and standard 1-side brushed finish for exposed ducts.

C. Aluminum Sheets: Comply with ASTM B 209, Alloy 3003, Temper H14; with mill finish for concealed ducts and standard, 1-side bright finish for exposed ducts.

D. Extruded Aluminum: Comply with ASTM B 221, Alloy 6063, Temper T6.

E. Reinforcement Shapes and Plates: Galvanized-steel reinforcement where installed on galvanized sheet metal ducts; compatible materials for aluminum and stainless-steel ducts.

F. Tie Rods: Galvanized steel, 1/4-inch minimum diameter for lengths 36 inches or less; 3/8-inch minimum diameter for lengths longer than 36 inches.

2.3 BACKDRAFT AND PRESSURE RELIEF DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Air Balance Inc.; a division of Mestek, Inc.
2. American Warming and Ventilating; a division of Mestek, Inc.
3. Cesco Products; a division of Mestek, Inc.
4. Greenheck Fan Corporation.
5. Lloyd Industries, Inc.
6. Nailor Industries Inc.

7. NCA Manufacturing, Inc.
8. Pottorff.
9. Ruskin Company.
10. Vent Products Company, Inc.

B. Description: Gravity balanced.

C. Frame: Hat-shaped, 0.063-inch- thick extruded aluminum, 0.03-inch-thick stainless steel], or 0.05-inch-thick stainless steel, with welded corners or mechanically attached and mounting flange.

D. Blades: Multiple single-piece blades, maximum 6-inch width, 0.025-inch-thick, roll-formed aluminum, or 0.050-inch-thick aluminum sheet with sealed edges.

E. Blade Action: Parallel.

F. Blade Seals: Extruded vinyl, mechanically locked or Neoprene, mechanically locked.

G. Blade Axles:

1. Material: Nonferrous metal, Stainless steel, or Aluminum.
2. Diameter: Minimum 0.20 inch.

H. Tie Bars and Brackets: Aluminum or Galvanized steel.

I. Return Spring: Adjustable tension.

J. Bearings: Synthetic pivot bushings.

K. Accessories:

1. Adjustment device to permit setting for varying differential static pressure.
2. Counterweights and spring-assist kits for vertical airflow installations.
3. Electric actuators.

4. Screen Mounting: Front mounted in sleeve.

a. Sleeve Thickness: 20 gage minimum.
b. Sleeve Length: 6 inches minimum.

5. Screen Material: Aluminum.
6. Screen Type: Insect.
7. 90-degree stops.

2.4 BAROMETRIC RELIEF DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Air Balance Inc.; a division of Mestek, Inc.
2. American Warming and Ventilating; a division of Mestek, Inc.
3. Cesco Products; a division of Mestek, Inc.
4. Greenheck Fan Corporation.
5. Lloyd Industries, Inc.
6. Nailor Industries Inc.
7. NCA Manufacturing, Inc.
8. Pottorff.
9. Ruskin Company.
10. Vent Products Company, Inc.

B. Suitable for horizontal or vertical mounting.

C. Frame: Hat-shaped, 0.063-inch- thick extruded aluminum, 0.03-inch-thick stainless steel], or 0.05-inch-thick stainless steel, with welded corners or mechanically attached and mounting flange.

D. Blades:

1. Multiple, 0.025-inch-thick, roll-formed aluminum or 0.050-inch-thick aluminum sheet.
2. Maximum Width: 6 inches.
3. Action: Parallel.
4. Balance: Gravity.

E. Blade Seals: Extruded vinyl, mechanically locked or Neoprene, mechanically locked.

F. Blade Axles: Nonferrous metal, Stainless steel, or Bronze.

G. Tie Bars and Brackets:

1. Material: Aluminum or Galvanized steel.
2. Rattle free with 90-degree stop.

H. Return Spring: Adjustable tension.

I. Bearings: Nonferrous metal, Stainless steel, or Bronze.

J. Accessories:

1. Flange on intake.
2. Adjustment device to permit setting for varying differential static pressure.
3. Counterweights and spring-assist kits for vertical airflow installations.

4. Electric actuators.

5. Screen Mounting: Front mounted in sleeve.

   a. Sleeve Thickness: 20 gage minimum.
   b. Sleeve Length: 6 inches minimum.
6. Screen Material: Aluminum.
7. Screen Type: Insect.
8. 90-degree stops.

2.5 MANUAL VOLUME DAMPERS

A. Standard, Steel, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Air Balance Inc.; a division of Mestek, Inc.
   b. American Warming and Ventilating; a division of Mestek, Inc.
   c. Flexmaster U.S.A., Inc.
   d. McGill AirFlow LLC.
   e. Nailor Industries Inc.
   f. Pottorff.
   g. Ruskin Company.
   h. Trox USA Inc.
   i. Vent Products Company, Inc.

2. Standard leakage rating, with linkage outside airstream.
3. Suitable for horizontal or vertical applications.

4. Frames:

   a. Frame: Hat-shaped 0.094-inch-thick, galvanized sheet steel or 0.05-inch-thick stainless steel.
   b. Mitered and welded corners.
   c. Flanges for attaching to walls and flangeless frames for installing in ducts.

5. Blades:

   a. Multiple or single blade.
   b. Parallel- or opposed-blade design.
   c. Stiffen damper blades for stability.
   d. Galvanized or Stainless-steel, 0.064 inch thick.
6. Blade Axles: Nonferrous metal.

7. Bearings:

a. Oil-impregnated bronze, Molded synthetic, or Oil-impregnated stainless-steel sleeve.
b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.

8. Tie Bars and Brackets: Galvanized steel.
9. Accessories:

a. Include locking device to hold single-blade dampers in a fixed position without vibration.

B. Standard, Aluminum, Manual Volume Dampers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Air Balance Inc.; a division of Mestek, Inc.
b. American Warming and Ventilating; a division of Mestek, Inc.
c. McGill AirFlow LLC.
d. Nailor Industries Inc.
e. Pottorff.
f. Ruskin Company.
g. Trox USA Inc.
h. Vent Products Company, Inc.

2. Standard leakage rating, with linkage outside airstream.
3. Suitable for horizontal or vertical applications.
4. Frames: Hat-shaped, 0.10-inch-thick, aluminum sheet channels; frames with flanges for attaching to walls and flangeless frames for installing in ducts.

5. Blades:

a. Multiple or single blade.
b. Parallel- or opposed-blade design.
c. Stiffen damper blades for stability.
d. Extruded-Aluminum Blades: 0.050-inch-thick extruded aluminum.

6. Blade Axles: Nonferrous metal.

7. Bearings:

a. Oil-impregnated bronze, Molded synthetic or Oil-impregnated stainless-steel sleeve.
b. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.

8. Tie Bars and Brackets: Aluminum.

9. Accessories:

   a. Include locking device to hold single-blade dampers in a fixed position without vibration.

C. Jackshaft:

1. Size: 0.5-inch or 1-inch diameter per manufacture requirements.
2. Material: Galvanized-steel pipe rotating within pipe-bearing assembly mounted on supports at each mullion and at each end of multiple-damper assemblies.
3. Length and Number of Mountings: As required to connect linkage of each damper in multiple-damper assembly.

D. Damper Hardware:

1. Zinc-plated, die-cast core with dial and handle made of 3/32-inch-thick zinc-plated steel, and a 3/4-inch hexagon locking nut.
2. Include center hole to suit damper operating-rod size.
3. Include elevated platform for insulated duct mounting.

2.6 CONTROL DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Warming and Ventilating; a division of Mestek, Inc.
2. Arrow United Industries; a division of Mestek, Inc.
3. Cesco Products; a division of Mestek, Inc.
4. Greenheck Fan Corporation.
5. Lloyd Industries, Inc.
6. McGill AirFlow LLC.
7. Metal Form Manufacturing, Inc.
8. Nailor Industries Inc.
9. NCA Manufacturing, Inc.
10. Pottorff.
11. Ruskin Company.
12. Vent Products Company, Inc.
13. Young Regulator Company.

B. Low-leakage rating, with linkage outside airstream, and bearing AMCA's Certified Ratings Seal for both air performance and air leakage.

C. Frames:

1. Hat, U, or Angle shaped.
2. 0.094-inch-thick, galvanized sheet steel or 0.05-inch-thick stainless steel.
3. Mitered and welded corners or Interlocking, gusseted corners.

D. Blades:

1. Multiple blade with maximum blade width of 6 inches
2. Opposed-blade design.
3. Galvanized-steel, Stainless steel, or Aluminum.
4. 0.064 inch thick single skin or 0.0747-inch-thick dual skin.
5. Blade Edging: Inflatable seal blade edging, or replaceable rubber seals.

E. Blade Axles: 1/2-inch-diameter; galvanized steel, stainless steel or nonferrous metal; blade-linkage hardware of zinc-plated steel and brass; ends sealed against blade bearings.

1. Operating Temperature Range: From minus 40 to plus 200 deg F.

F. Bearings:

1. Oil-impregnated bronze.
2. Dampers in ducts with pressure classes of 3-inch wg or less shall have axles full length of damper blades and bearings at both ends of operating shaft.
3. Thrust bearings at each end of every blade.

2.7 FIRE DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Air Balance Inc.; a division of Mestek, Inc.
2. Arrow United Industries; a division of Mestek, Inc.
3. Cesco Products; a division of Mestek, Inc.
4. Greenheck Fan Corporation.
5. Nailor Industries Inc.
6. NCA Manufacturing, Inc.
7. Pottorff.
8. Prefco; Perfect Air Control, Inc.
9. Ruskin Company.
10. Vent Products Company, Inc.
11. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Type: Dynamic; rated and labeled according to UL 555 by an NRTL.

C. Closing rating in ducts up to 4-inch wg static pressure class and minimum 2000 or 4000-fpm velocity. (Velocity rating shall be above actual installed duct velocity.)

D. Fire Rating: As required.

E. Frame: Curtain type with blades outside airstream except when located behind grille where blades may be inside airstream; fabricated with roll-formed, 0.034-inch-thick galvanized steel; with mitered and interlocking corners.

F. Mounting Sleeve: Factory- or field-installed, galvanized sheet steel.

1. Minimum Thickness: 0.138 inch thick, as indicated, and of length to suit application.
2. Exception: Omit sleeve where damper-frame width permits direct attachment of perimeter mounting angles on each side of wall or floor; thickness of damper frame must comply with sleeve requirements.

G. Mounting Orientation: Vertical or horizontal as indicated.

H. Blades: Roll-formed, interlocking, 0.024-inch-or 0.034-inch-thick, galvanized sheet steel. In place of interlocking blades, use full-length, 0.034-inch-thick, galvanized-steel blade connectors.

I. Horizontal Dampers: Include blade lock and stainless-steel closure spring.

J. Heat-Responsive Device: Replaceable, 165 deg F or 212 deg Frated, fusible links.

2.8 SMOKE DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Air Balance Inc.; a division of Mestek, Inc.
2. Cesco Products; a division of Mestek, Inc.
3. Greenheck Fan Corporation.
4. Nailor Industries Inc.
5. Pottorff.
6. Prefco; Perfect Air Control, Inc.
7. Ruskin Company.

B. General Requirements: Label according to UL 555S by an NRTL.

C. Smoke Detector: Integral, factory wired for single-point connection.

D. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel, with welded or interlocking, gusseted or mechanically attached corners and mounting flange.

E. Blades: Roll-formed, horizontal, interlocking or overlapping, minimum 0.034-inch-thick, galvanized sheet steel.

F. Leakage: Class I class.

G. Rated pressure and velocity to exceed design airflow conditions.

H. Mounting Sleeve: Factory-installed, minimum 0.039-inch-thick, galvanized sheet steel; length to suit wall or floor application with factory-furnished silicone calking.

I. Damper Motors: Modulating or two-position action as required. (Action shall meet design drawings sequence of operations.)

J. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Section 230923 "Direct Digital Control (DDC) System for HVAC."
3. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
4. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for service or adjustments. Size for running torque rating of 150 in. x lbf and breakaway torque rating of 150 in. x lbf.
5. Outdoor Motors and Motors in Outdoor-Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40 deg F.
6. Nonspring-Return Motors: For dampers larger than 25 sq. ft., size motor for running torque rating of 150 in. x lbf and breakaway torque rating of 300 in. x lbf.
7. Electrical Connection: 115 V, single phase, 60 Hz or 24Vac as required.

K. Accessories:

1. Auxiliary switches for signaling, fan control, or position indication.
2. Test and reset switches and lights, operator station with damper remote mounted.

2.9 COMBINATION FIRE AND SMOKE DAMPERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Air Balance Inc.; a division of Mestek, Inc.
2. Cesco Products; a division of Mestek, Inc.
3. Greenheck Fan Corporation.
4. Nailor Industries Inc.

5. Pottorff.
6. Ruskin Company.

B. Type: Dynamic; rated and labeled according to UL 555 and UL 555S by an NRTL.

C. Closing rating in ducts up to 4-inch wg static pressure class and minimum 2000 or 4000-fpm velocity. (Velocity rating shall be above actual installed duct velocity.)

D. Fire Rating: As Required.

E. Frame: Hat-shaped, 0.094-inch-thick, galvanized sheet steel, with welded or interlocking, gusseted or mechanically attached corners and mounting flange.

F. Heat-Responsive Device: Resettable, 165 deg F rated, fire-closure device.

G. Heat-Responsive Device: Electric resettable device and switch package, factory installed, rated.

H. Smoke Detector: Provide within 5’ of Combination fire smoke damper. (Refer to 283111)

I. Blades: Roll-formed, horizontal, interlocking or overlapping, minumim 0.034-inch-thick, galvanized sheet steel.

J. Leakage: Class I class.

K. Rated pressure and velocity to exceed design airflow conditions.

L. Mounting Sleeve: Factory-installed, minimum 0.039-inch-thick, galvanized sheet steel; length to suit wall or floor application with factory-furnished silicone calking.

M. Master control panel for use in dynamic smoke-management systems.

N. Damper Motors: Two-position action.

O. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

1. Motor Sizes: Minimum size as indicated. If not indicated, large enough so driven load will not require motor to operate in service factor range above 1.0.
2. Controllers, Electrical Devices, and Wiring: Comply with requirements for electrical devices and connections specified in Section 230923 "Direct Digital Control (DDC) System for HVAC."
3. Permanent-Split-Capacitor or Shaded-Pole Motors: With oil-immersed and sealed gear trains.
4. Spring-Return Motors: Equip with an integral spiral-spring mechanism where indicated. Enclose entire spring mechanism in a removable housing designed for

service or adjustments. Size for running torque rating of 150 in. x lbf and breakaway torque rating of 150 in. x lbf.

5. Outdoor Motors and Motors in Outdoor-Air Intakes: Equip with O-ring gaskets designed to make motors weatherproof. Equip motors with internal heaters to permit normal operation at minus 40 deg F.
6. Nonspring-Return Motors: For dampers larger than 25 sq. ft., size motor for running torque rating of 150 in. x lbf and breakaway torque rating of 300 in. x lbf.
7. Electrical Connection: 115 V, single phase, 60 Hz or 24Vac as required.

P. Accessories:

1. Auxiliary switches for signaling, fan control, or position indication.
2. Test and reset switches and lights, operator station with damper remote mounted.

2.10 FLANGE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Nexus PDQ; Division of Shilco Holdings Inc.
3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Description: [Add-on] [or] [roll-formed], factory-fabricated, slide-on transverse flange connectors, gaskets, and components.

C. Material: Galvanized steel.

D. Gage and Shape: Match connecting ductwork.

2.11 TURNING VANES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. Elgen Manufacturing.
4. METALAIRE, Inc.
5. SEMCO Incorporated.
6. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Manufactured Turning Vanes for Metal Ducts: Curved blades of galvanized sheet steel; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

1. Acoustic Turning Vanes: Fabricate airfoil-shaped aluminum extrusions with perforated faces and fibrous-glass fill.

C. Manufactured Turning Vanes for Nonmetal Ducts: Fabricate curved blades of resin-bonded fiberglass with acrylic polymer coating; support with bars perpendicular to blades set; set into vane runners suitable for duct mounting.

D. General Requirements: Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 4-3, "Vanes and Vane Runners," and 4-4, "Vane Support in Elbows."

E. Vane Construction: Single wall for ducts up to 12 inches wide and double wall for larger dimensions.

2.12 REMOTE DAMPER OPERATORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Pottorff.
2. Ventfabrics, Inc.
3. Young Regulator Company.

B. Description: Cable system designed for remote manual damper adjustment.

C. Cable: Stainless steel.

D. Wall-Box Mounting: Recessed.

E. Wall-Box Cover-Plate Material: Painted Steel or polished Stainless steel.

2.13 DUCT-MOUNTED ACCESS DOORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. American Warming and Ventilating; a division of Mestek, Inc.
2. Cesco Products; a division of Mestek, Inc.
3. Ductmate Industries, Inc.
4. Elgen Manufacturing.
5. Flexmaster U.S.A., Inc.
6. Greenheck Fan Corporation.
7. McGill AirFlow LLC.
8. Nailor Industries Inc.
9. Pottorff.

10. Ventfabrics, Inc.
11. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Duct-Mounted Access Doors: Fabricate access panels according to SMACNA's "HVAC Duct Construction Standards - Metal and Flexible"; Figures 7-2, "Duct Access Doors and Panels," and 7-3, "Access Doors - Round Duct."

1. Door:

a. Double wall, rectangular.
b. Galvanized sheet metal with insulation fill and thickness as indicated for duct pressure class.
c. Hinges and Latches: 1-by-1-inchbutt or piano hinge and cam latches.
d. Fabricate doors airtight and suitable for duct pressure class.

2. Frame: Galvanized sheet steel, with bend-over tabs and foam gaskets.

3. Number of Hinges and Locks:

a. Access Doors Less Than 12 Inches Square: No hinges and two sash locks.
b. Access Doors up to 18 Inches Square: Continuous and two sash locks.
c. Access Doors up to 24 by 48 Inches: Continuous and two compression latches.
d. Access Doors Larger Than 24 by 48 Inches: Continuous and two compression latches with outside and inside handles.

C. Pressure Relief Access Door:

1. Door and Frame Material: Galvanized sheet steel.
2. Door: [Double wall with insulation fill with metal thickness applicable for duct pressure class.
3. Operation: Open outward for positive-pressure ducts and inward for negative-pressure ducts.
4. Factory set pressure to match pressure class, with field adjustment capability.
5. Doors close when pressures are within set-point range.
6. Hinge: Continuous piano.
7. Latches: Cam.
8. Seal: Neoprene or foam rubber.
9. Insulation Fill: 1-inch-thick, fibrous-glass or polystyrene-foam board.

2.14 DUCT ACCESS PANEL ASSEMBLIES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Flame Gard, Inc.

3. 3M.

B. Labeled according to UL 1978 by an NRTL.

C. Panel and Frame: Minimum thickness 0.0528-inch carbon or 0.0428-inch stainless steel (match duct material type).

D. Fasteners: Stainless steel. Panel fasteners shall not penetrate duct wall.

E. Gasket: Comply with NFPA 96; grease-tight, high-temperature ceramic fiber, rated for minimum 2000 deg F.

F. Minimum Pressure Rating: 10-inch wg, positive or negative.

2.15 FLEXIBLE CONNECTORS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Ductmate Industries, Inc.
2. Duro Dyne Inc.
3. Elgen Manufacturing.
4. Ventfabrics, Inc.
5. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Materials: Flame-retardant or noncombustible fabrics.

C. Coatings and Adhesives: Comply with UL 181, Class 1.

D. Metal-Edged Connectors: Factory fabricated with a fabric strip 5-3/4 inches wide attached to two strips of 2-3/4-inch-wide, 0.028-inch-thick, galvanized sheet steel or 0.032-inch-thick aluminum sheets. Provide metal compatible with connected ducts.

E. Indoor System, Flexible Connector Fabric: Glass fabric double coated with neoprene.

1. Minimum Weight: 26 oz./sq. yd..
2. Tensile Strength: 480 lbf/inch in the warp and 360 lbf/inch in the filling.
3. Service Temperature: Minus 40 to plus 200 deg F.

F. Outdoor System, Flexible Connector Fabric: Glass fabric double coated with weatherproof, synthetic rubber resistant to UV rays and ozone.

1. Minimum Weight: 24 oz./sq. yd..
2. Tensile Strength: 530 lbf/inch in the warp and 440 lbf/inch in the filling.
3. Service Temperature: Minus 50 to plus 250 deg F.

G. High-Temperature System, Flexible Connectors: Glass fabric coated with silicone rubber.

1. Minimum Weight: 16 oz./sq. yd..
2. Tensile Strength: 285 lbf/inch in the warp and 185 lbf/inch in the filling.
3. Service Temperature: Minus 67 to plus 500 deg F.

H. High-Corrosive-Environment System, Flexible Connectors: Glass fabric with chemical-resistant coating.

1. Minimum Weight: 14 oz./sq. yd..
2. Tensile Strength: 450 lbf/inch in the warp and 340 lbf/inch in the filling.
3. Service Temperature: Minus 67 to plus 500 deg F.

2.16 FLEXIBLE DUCTS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Flexmaster U.S.A., Inc.
2. McGill AirFlow LLC.
3. Ward Industries, Inc.; a division of Hart & Cooley, Inc.

B. Noninsulated, Flexible Duct: UL 181, Class 1, aluminum laminate and polyester film with latex adhesive supported by helically wound, spring-steel wire.

1. Pressure Rating: 10-inch wg positive and 1.0-inch wg negative.
2. Maximum Air Velocity: 4000 fpm.
3. Temperature Range: Minus 20 to plus 210 deg F.

C. Insulated, Flexible Duct: UL 181, Class 1, black polymer film supported by helically wound, spring-steel wire; fibrous-glass insulation; [polyethylene] [aluminized] vapor-barrier film.

1. Pressure Rating: 4-inch wg positive and 0.5-inch wg negative.
2. Maximum Air Velocity: 4000 fpm.
3. Temperature Range: Minus 20 to plus 175 deg F.
4. Insulation R-Value: Comply with ASHRAE/IESNA 90.1.

D. Flexible Duct Connectors:

1. Clamps: Stainless-steel band with cadmium-plated hex screw to tighten band with a worm-gear action or Nylon strap in sizes 3 through 18 inches, to suit duct size.
2. Non-Clamp Connectors: Not allowed.

2.17 DUCT ACCESSORY HARDWARE

A. Instrument Test Holes: Cast iron or cast aluminum to suit duct material, including screw cap and gasket. Size to allow insertion of pitot tube and other testing instruments and of length to suit duct-insulation thickness.

B. Adhesives: High strength, quick setting, neoprene based, waterproof, and resistant to gasoline and grease.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install duct accessories according to applicable details in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible" for metal ducts and in NAIMA AH116, "Fibrous Glass Duct Construction Standards," for fibrous-glass ducts.

B. Install duct accessories of materials suited to duct materials; use galvanized-steel accessories in galvanized-steel and fibrous-glass ducts, stainless-steel accessories in stainless-steel ducts, and aluminum accessories in aluminum ducts.

C. Install backdraft and/or control dampers at inlet of exhaust fans or exhaust ducts as close as possible to exhaust fan unless otherwise indicated.

D. Install volume dampers at points on supply, return, and exhaust systems where branches extend from larger ducts. Where dampers are installed in ducts having duct liner, install dampers with hat channels of same depth as liner, and terminate liner with nosing at hat channel.

1. Install steel volume dampers in steel ducts.
2. Install aluminum volume dampers in aluminum ducts.

E. Set dampers to fully open position before testing, adjusting, and balancing.

F. Install test holes at fan inlets and outlets and elsewhere as indicated.

G. Install fire and smoke dampers according to UL listing.

H. Connect ducts to vibrating equipment with flexible duct connectors. Insulate flexible duct connectors with flexible insulating system.

I. Install duct access doors on sides of ducts to allow for inspecting, adjusting, and maintaining accessories and equipment at the following locations:

1. On both sides of duct coils.
2. Upstream and downstream from duct filters.

3. At outdoor-air intakes and mixed-air plenums.
4. At drain pans and seals.
5. Downstream from manual volume dampers, control dampers, backdraft dampers, and equipment.
6. Adjacent to and close enough to fire or smoke dampers, to reset or reinstall fusible links. Access doors for access to fire or smoke dampers having fusible links shall be pressure relief access doors and shall be outward operation for access doors installed upstream from dampers and inward operation for access doors installed downstream from dampers.
7. At each change in direction and at maximum 50-foot spacing.
8. Upstream from turning vanes.
9. Control devices requiring inspection or maintenance.
10. Elsewhere as indicated.

J. Install access doors with swing against duct static pressure.

K. Access Door Sizes (Access door size shall be coordinated with actual duct dimensions.):

1. One-Hand or Inspection Access: 12 by 12 inches.
2. Two-Hand Access: 12 by 12 inches.
3. Head and Hand Access: 16 by 20 inches.
4. Head and Shoulders Access: 24 by 24 inches.
5. Body Access: 24 by 24 inches.
6. Body plus Ladder Access: 24 by 24 inches.

L. Label access doors according to Section 230553 "Identification for HVAC Piping and Equipment" to indicate the purpose of access door.

M. Connect diffusers or light troffer boots to ducts with maximum 60-inch lengths of flexible duct clamped or strapped in place.

N. Connect flexible ducts to metal ducts with draw bands and sealed with mastic reinforced with fiberglass mesh.

O. Install duct test holes where required for testing and balancing purposes.

P. Install thrust limits at centerline of thrust, symmetrical on both sides of equipment. Attach thrust limits at centerline of thrust and adjust to a maximum of 1/4-inch movement during start and stop of fans.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Operate dampers to verify full range of movement.

2. Inspect locations of access doors and verify that purpose of access door can be performed.
3. Operate fire, smoke, and combination fire and smoke dampers to verify full range of movement and verify that proper heat-response device is installed.
4. Inspect turning vanes for proper and secure installation.
5. Operate remote damper operators to verify full range of movement of operator and damper.

END OF SECTION 23 33 00

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SECTION 23 34 16 - CENTRIFUGAL HVAC FANS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes: For each product.

1. Airfoil centrifugal fans.
2. Backward-inclined centrifugal fans.
3. Forward-curved centrifugal fans.
4. Plenum fans.
5. Plug fans.
6. Lab exhaust fans.

1.3 ACTION SUBMITTALS

A. Product Data:

1. Include rated capacities, furnished specialties, and accessories for each fan.
2. Certified fan performance curves with system operating conditions indicated.
3. Certified fan sound-power ratings.
4. Motor ratings and electrical characteristics, plus motor and electrical accessories.
5. Material thickness and finishes, including color charts.
6. Dampers, including housings, linkages, and operators.

B. Shop Drawings:

1. Include plans, elevations, sections, and attachment details.
2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Include diagrams for power, signal, and control wiring.
4. Design Calculations: Calculate requirements for selecting vibration isolators and seismic restraints and for designing vibration isolation bases.

5. Vibration Isolation Base Details: Detail fabrication, including anchorages and attachments to structure and to supported equipment. Include auxiliary motor slides and rails, and base weights.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Show fan room layout and relationships between components and adjacent structural and mechanical elements. Show support locations, type of support, and weight on each support. Indicate and certify field measurements.

B. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For centrifugal fans to include in emergency, operation, and maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

A. Belts: One set(s) for each belt-driven unit.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. AMCA Compliance:

1. Comply with AMCA performance requirements and bear the AMCA-Certified Ratings Seal.
2. Operating Limits: Classify according to AMCA 99.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.2 AIRFOIL CENTRIFUGAL FANS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Acme Engineering & Mfg. Corp.
2. Chicago Blower Corporation.

3. Cincinnati Fan.
4. Greenheck.
5. Loren Cook Company.

B. Description:

1. Factory-fabricated, -assembled, -tested, and -finished, belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor, drive assembly, and support structure.
2. Deliver fans as factory-assembled units, to the extent allowable by shipping limitations.
3. Factory-installed and -wired disconnect switch.

C. Housings:

1. Formed panels to make curved-scroll housings with shaped cutoff.
2. Panel Bracing: Steel angle- or channel-iron member supports for mounting and supporting fan scroll, wheel, motor, and accessories.
3. Spun inlet cone with flange.
4. Outlet flange.

D. Airfoil Wheels:

1. Single-width-single-inlet and double-width-double-inlet construction with curved inlet flange.
2. Heavy backplate.
3. Hollow die-formed, airfoil-shaped blades continuously welded at tip flange and backplate.
4. Cast-iron or cast-steel hub riveted to backplate and fastened to shaft with set screws.

E. Shafts:

1. Statically and dynamically balanced and selected for continuous operation at maximum rated fan speed and motor horsepower, with adjustable alignment and belt tensioning.
2. Turned, ground, and polished hot-rolled steel with keyway. Ship with protective coating of lubricating oil.
3. Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.

F. Prelubricated and Sealed Shaft Bearings:

1. Self-aligning, pillow-block-type bearings.
2. Bearing Rating Life: ABMA 9 / ABMA 11, Ll0 at 50,000 hours.

G. Grease-Lubricated Shaft Bearings:

1. Self-aligning, pillow-block-type, tapered roller bearings with double-locking collars and two-piece, cast-iron housing.
2. Bearing Rating Life: ABMA 9 / ABMA 11, Ll0 at 50,000 hours.

H. Grease-Lubricated Shaft Bearings:

1. Self-aligning, pillow-block-type, ball or roller bearings with adapter mount and two-piece, cast-iron housing.
2. Bearing Rating Life: ABMA 9 / ABMA 11, Ll0 at 50,000 hours.

I. Belt Drives:

1. Factory mounted, with adjustable alignment and belt tensioning.
2. Service Factor Based on Fan Motor Size: 1.5.
3. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
4. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
5. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
6. Belt Guards: Fabricate to comply with OSHA and SMACNA requirements of diamond-mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation. Include provisions for adjustment of belt tension, lubrication, and use of tachometer with guard in place.
7. Motor Mount: Adjustable for belt tensioning.

J. Accessories:

1. Access for Inspection, Cleaning, and Maintenance: Comply with requirements in ASHRAE 62.1.
2. Scroll Drain Connection: NPS 1 steel pipe coupling welded to low point of fan scroll.
3. Companion Flanges: Rolled flanges for duct connections of same material as housing.
4. Discharge Dampers: Assembly with opposed blades constructed of two plates formed around and to shaft, channel frame, and sealed ball bearings; with blades linked outside of airstream to single control lever of same material as housing.
5. Inlet Screens: Grid screen of same material as housing.
6. Shaft Cooler: Metal disk between bearings and fan wheel, designed to dissipate heat from shaft.
7. Spark-Resistant Construction: AMCA 99.
8. Shaft Seals: Airtight seals installed around shaft on drive side of single-width fans.
9. Weather Cover: Enameled-steel sheet with ventilation slots, bolted to housing.

2.3 BACKWARD-INCLINED CENTRIFUGAL FANS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Acme Engineering & Mfg. Corp.
2. Aerovent; a Twin City Fan company.
3. Central Blower Company.
4. Chicago Blower Corporation.
5. Cincinnati Fan.
6. Greenheck
7. Howden Buffalo Inc.
8. Loren Cook Company.
9. New York Blower Company (The).

B. Description:

1. Factory-fabricated, -assembled, -tested, and -finished, belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor, drive assembly, and support structure.
2. Deliver fans as factory-assembled units, to the extent allowable by shipping limitations.
3. Factory-installed and -wired disconnect switch.

C. Housings:

1. Formed panels to make curved-scroll housings with shaped cutoff.
2. Panel Bracing: Steel angle- or channel-iron member supports for mounting and supporting fan scroll, wheel, motor, and accessories.
3. Spun inlet cone with flange.
4. Outlet flange.

D. Backward-Inclined Wheels:

1. Single-width-single-inlet and double-width-double-inlet construction with curved inlet flange, backplate, backward-inclined blades, and fastened to shaft with set screws.
2. Welded or riveted to flange and backplate; cast-iron or cast-steel hub riveted to backplate.

E. Shafts:

1. Statically and dynamically balanced and selected for continuous operation at maximum rated fan speed and motor horsepower, with adjustable alignment and belt tensioning.
2. Turned, ground, and polished hot-rolled steel with keyway. Ship with protective coating of lubricating oil.

3. Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.

F. Prelubricated and Sealed Shaft Bearings:

1. Self-aligning, pillow-block-type ball bearings.
2. Bearing Rating Life: ABMA 9 / ABMA 11, Ll0 at 50,000 hours.

G. Grease-Lubricated Shaft Bearings:

1. Self-aligning, pillow-block-type, tapered roller bearings with double-locking collars and two-piece, cast-iron housing.
2. Bearing Rating Life: ABMA 9 / ABMA 11, Ll0 at 50,000 hours.

H. Grease-Lubricated Shaft Bearings:

1. Self-aligning, pillow-block-type, ball or roller bearings with adapter mount and two-piece, cast-iron housing.
2. Bearing Rating Life: ABMA 9 / ABMA 11, Ll0 at 50,000 hours.

I. Belt Drives:

1. Factory mounted, with adjustable alignment and belt tensioning.
2. Service Factor Based on Fan Motor Size: 1.5.
3. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
4. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
5. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
6. Belt Guards: Fabricate to comply with OSHA and SMACNA requirements of diamond-mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation. Include provisions for adjustment of belt tension, lubrication, and use of tachometer with guard in place.
7. Motor Mount: Adjustable for belt tensioning.

J. Accessories:

1. Access for Inspection, Cleaning, and Maintenance: Comply with requirements in ASHRAE 62.1.
2. Scroll Drain Connection: NPS 1 steel pipe coupling welded to low point of fan scroll.
3. Companion Flanges: Rolled flanges for duct connections of same material as housing.

4. Discharge Dampers: Assembly with opposed blades constructed of two plates formed around and to shaft, channel frame, and sealed ball bearings; with blades linked outside of airstream to single control lever of same material as housing.
5. Inlet Screens: Grid screen of same material as housing.
6. Shaft Cooler: Metal disk between bearings and fan wheel, designed to dissipate heat from shaft.
7. Spark-Resistant Construction: AMCA 99.
8. Shaft Seals: Airtight seals installed around shaft on drive side of single-width fans.
9. Weather Cover: Enameled-steel sheet with ventilation slots, bolted to housing.

2.4 FORWARD-CURVED CENTRIFUGAL FANS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Acme Engineering & Mfg. Corp.
2. Central Blower Company.
3. Greenheck
4. Howden Buffalo Inc.
5. Lau Industries.
6. New York Blower Company (The).

B. Description:

1. Factory-fabricated, -assembled, -tested, and -finished, belt-driven centrifugal fans consisting of housing, wheel, fan shaft, bearings, motor, drive assembly, and support structure.
2. Deliver fans as factory-assembled units, to the extent allowable by shipping limitations.
3. Factory-installed and -wired disconnect switch.

C. Housings:

1. Formed panels to make curved-scroll housings with shaped cutoff.
2. Panel Bracing: Steel angle- or channel-iron member supports for mounting and supporting fan scroll, wheel, motor, and accessories.
3. Spun inlet cone with flange.
4. Outlet flange.

D. Forward-Curved Wheels:

1. Black-enameled or galvanized-steel construction with inlet flange, backplate, shallow blades with inlet and tip curved forward in direction of airflow.
2. Mechanically secured to flange and backplate; cast-steel hub swaged to backplate and fastened to shaft with set screws.

E. Shafts:

1. Statically and dynamically balanced and selected for continuous operation at maximum rated fan speed and motor horsepower, with adjustable alignment and belt tensioning.
2. Turned, ground, and polished hot-rolled steel with keyway. Ship with protective coating of lubricating oil.
3. Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.

F. Prelubricated and Sealed Shaft Bearings:

1. Self-aligning, pillow-block-type ball bearings.
2. Bearing Rating Life: ABMA 9 / ABMA 11, Ll0 at 50,000 hours.

G. Grease-Lubricated Shaft Bearings:

1. Self-aligning, pillow-block-type, tapered roller bearings with double-locking collars and two-piece, cast-iron housing.
2. Bearing Rating Life: ABMA 9 / ABMA 11, Ll0 at 50,000 hours.

H. Grease-Lubricated Shaft Bearings:

1. Self-aligning, pillow-block-type, ball or roller bearings with adapter mount and two-piece, cast-iron housing.
2. Bearing Rating Life: ABMA 9 / ABMA 11, Ll0 at 50,000 hours.

I. Belt Drives:

1. Factory mounted, with adjustable alignment and belt tensioning.
2. Service Factor Based on Fan Motor Size: 1.5.
3. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
4. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
5. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.

6. Belt Guards: Fabricate to comply with OSHA and SMACNA requirements of diamond-mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation. Include provisions for adjustment of belt tension, lubrication, and use of tachometer with guard in place.
7. Motor Mount: Adjustable for belt tensioning.

J. Accessories:

1. Access for Inspection, Cleaning, and Maintenance: Comply with requirements in ASHRAE 62.1.
2. Scroll Drain Connection: NPS 1 steel pipe coupling welded to low point of fan scroll.
3. Companion Flanges: Rolled flanges for duct connections of same material as housing.
4. Discharge Dampers: Assembly with opposed blades constructed of two plates formed around and to shaft, channel frame, and sealed ball bearings; with blades linked outside of airstream to single control lever of same material as housing.
5. Inlet Screens: Grid screen of same material as housing.
6. Shaft Cooler: Metal disk between bearings and fan wheel, designed to dissipate heat from shaft.
7. Spark-Resistant Construction: AMCA 99.
8. Shaft Seals: Airtight seals installed around shaft on drive side of single-width fans.
9. Weather Cover: Enameled-steel sheet with ventilation slots, bolted to housing.

2.5 PLENUM FANS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Aerovent; a Twin City Fan company.
2. Chicago Blower Corporation.
3. CML Northern Blower Inc.
4. Greenheck
5. Howden Buffalo Inc.
6. Loren Cook Company.

B. Description:

1. Factory-fabricated, -assembled, -tested, and -finished, belt-driven centrifugal fans consisting of wheel, fan shaft, bearings, motor, drive assembly, and support structure.
2. Deliver fans as factory-assembled units, to the extent allowable by shipping limitations.
3. Factory-installed and -wired disconnect switch.

C. Airfoil Wheels:

1. Single-width-single-inlet construction with smooth-curved inlet flange.
2. Heavy backplate.
3. Hollow die-formed, airfoil-shaped blades continuously welded at tip flange and backplate.
4. Cast-iron or cast-steel hub riveted to backplate and fastened to shaft with set screws.

D. Shafts:

1. Statically and dynamically balanced and selected for continuous operation at maximum-rated fan speed and motor horsepower, with adjustable alignment and belt tensioning.
2. Turned, ground, and polished hot-rolled steel with keyway. Ship with protective coating of lubricating oil.
3. Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.

E. Prelubricated and Sealed Shaft Bearings:

1. Self-aligning, pillow-block-type ball bearings.
2. Bearing Rating Life: ABMA 9 / ABMA 11, Ll0 at 50,000 hours.

F. Grease-Lubricated Shaft Bearings:

1. Self-aligning, pillow-block-type, tapered roller bearings with double-locking collars and two-piece, cast-iron housing.
2. Bearing Rating Life: ABMA 9 / ABMA 11, Ll0 at 50,000 hours.

G. Grease-Lubricated Shaft Bearings:

1. Self-aligning, pillow-block-type, ball or roller bearings with adapter mount and two-piece, cast-iron housing.
2. Bearing Rating Life: ABMA 9 / ABMA 11, Ll0 at 50,000 hours.

H. Belt Drives:

1. Factory mounted, with adjustable alignment and belt tensioning.
2. Service Factor Based on Fan Motor Size: [1.5] [1.4] [1.3] [1.2].
3. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
4. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
5. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
6. Belt Guards: Fabricate to comply with OSHA and SMACNA requirements of diamond-mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation. Include provisions for adjustment of belt tension, lubrication, and use of tachometer with guard in place.
7. Motor Mount: Adjustable for belt tensioning.

I. Accessories:

1. Shaft Cooler: Metal disk between bearings and fan wheel, designed to dissipate heat from shaft.
2. Spark-Resistant Construction: AMCA 99.
3. Shaft Seals: Airtight seals installed around shaft on drive side of single-width fans.

2.6 PLUG FANS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Aerovent; a Twin City Fan company.
2. Chicago Blower Corporation.
3. Cincinnati Fan.
4. CML Northern Blower Inc.
5. Greenheck
6. Howden Buffalo Inc.
7. Loren Cook Company.
8. New York Blower Company (The).

B. Description:

1. Factory-fabricated, -assembled, -tested, and -finished, belt-driven centrifugal fans consisting of wheel, fan shaft, bearings, motor, drive assembly, and support structure.
2. Deliver fans as factory-assembled units, to the extent allowable by shipping limitations.
3. Factory-installed and -wired disconnect switch.

C. Airfoil Wheels:

1. Single-width-single-inlet construction with smooth-curved inlet flange.
2. Heavy backplate.
3. Hollow die-formed, airfoil-shaped blades continuously welded at tip flange and backplate.
4. Cast-iron or cast-steel hub riveted to backplate and fastened to shaft with set screws.

D. Shafts:

1. Statically and dynamically balanced and selected for continuous operation at maximum rated fan speed and motor horsepower, with adjustable alignment and belt tensioning.
2. Turned, ground, and polished hot-rolled steel with keyway. Ship with protective coating of lubricating oil.
3. Designed to operate at no more than 70 percent of first critical speed at top of fan's speed range.

E. Prelubricated and Sealed Shaft Bearings:

1. Self-aligning, pillow-block-type ball bearings.
2. Bearing Rating Life: ABMA 9 / ABMA 11, Ll0 at 50,000 hours.

F. Grease-Lubricated Shaft Bearings:

1. Self-aligning, pillow-block-type, tapered roller bearings with double-locking collars and two-piece, cast-iron housing.
2. Bearing Rating Life: ABMA 9 / ABMA 11, Ll0 at 50,000 hours.

G. Grease-Lubricated Shaft Bearings:

1. Self-aligning, pillow-block-type, ball or roller bearings with adapter mount and two-piece, cast-iron housing.
2. Bearing Rating Life: ABMA 9 / ABMA 11, Ll0 at 50,000 hours.

H. Belt Drives:

1. Factory mounted, with adjustable alignment and belt tensioning.
2. Service Factor Based on Fan Motor Size: 1.5.
3. Fan Pulleys: Cast iron or cast steel with split, tapered bushing; dynamically balanced at factory.
4. Motor Pulleys: Adjustable pitch for use with motors through 5 hp; fixed pitch for use with larger motors. Select pulley so pitch adjustment is at the middle of adjustment range at fan design conditions.
5. Belts: Oil resistant, nonsparking, and nonstatic; matched sets for multiple belt drives.
6. Belt Guards: Fabricate to comply with OSHA and SMACNA requirements of diamond-mesh wire screen welded to steel angle frame or equivalent, prime coated. Secure to fan or fan supports without short circuiting vibration isolation. Include provisions for adjustment of belt tension, lubrication, and use of tachometer with guard in place.
7. Motor Mount: Adjustable for belt tensioning.

I. Accessories:

1. Shaft Cooler: Metal disk between bearings and fan wheel, designed to dissipate heat from shaft.
2. Spark-Resistant Construction: AMCA 99.
3. Shaft Seals: Airtight seals installed around shaft on drive side of single-width fans.

2.7 LAB EXHAUST FANS

A. General:

1. Basis of Design: Greenheck or approved equal
2. Base fan performance at standard conditions (density 0.075 Lb. /ft3).
3. Fans selected shall be capable of accommodating static pressure and flow variations of +/-15% of scheduled values.
4. Each fan shall be belt driven.
5. Fans to be equipped with 316 stainless steel lifting lugs for corrosion resistance.
6. Fasteners exposed to corrosive exhaust shall be stainless steel.
7. Fan assembly shall be designed for a minimum of 125 MPH wind loading, without the use of guy wires.

B. Corrosion Resistant Coating:

1. All fan and system components (fan, nozzle, wind band, plenum) shall be corrosion resistant coated with LabCoat™, a two part electrostatically applied and baked, sustainable, corrosion resistant coating system; or Heresite P-413C. Standard finish color to be RAL 7023, concrete grey. All parts shall be cleaned and chemically prepared for coating using a multi-stage wash system which includes acid pickling that removes oxide, increases surface area, and improves coating bond to the substrate. The first powder coat applied over the prepared surface shall be a zinc rich epoxy primer (no less than 70% zinc) and heated to a gelatinous consistency (partial cure) at which the second powder coat of polyester resin shall be electrostatically applied and simultaneously be cured at a uniform temperature of 400°F. The coating system, a total thickness of up to 6 mils, is not affected by the UV component of sunlight (does not chalk), and has superior corrosion resistance to acid, alkali, and solvents. Coating system shall exceed 4000 hour ASTM B117 Salt Spray Resistance. Note that 10-20 mil thick wet coating systems pollute the environment (air and water), and that these manually applied coatings are not uniform over the impeller surface and can cause fan imbalance and vibration.

C. Fan Housing And Outlet:

1. Fan housing to be aerodynamically designed with high-efficiency inlet, engineered to reduce incoming air turbulence.
2. Fan housing shall be welded steel and meet specification section 2.15 for corrosion resistant coating. No uncoated metal fan parts shall be acceptable.
3. Fan housings that are fabricated of polypropylene or fiberglass that have lower mechanical properties than steel, have rough interior surfaces in which corrosive, hazardous compounds can collect, and / or which chalk and structurally degrade due to the UV component of the sunlight shall not be acceptable.
4. A high velocity conical discharge nozzle shall be supplied by the fan manufacturer and be designed to efficiently handle an outlet velocity of up to 6000 FPM. Discharge stack caps or hinged covers, impeding exhaust flow shall not be permitted.
5. Provide housing drain for removal of rain and condensation.
6. A bolted and gasketed access door shall be supplied in the fan housing allowing for impeller inspection or removal of impeller, shaft and bearings without removal of the fan housing.

D. Variable Nozzle:

1. Factory assembled fan discharge nozzle with variable discharge area capable of maintaining constant discharge velocity at variable fan volumes.
2. Nozzle housing and adjustable blade to be heavy gauge steel construction. Variable nozzle coating shall meet specification section 2.15 for corrosion resistant coating in the Laboratory Exhaust Fan specification.
3. Moveable discharge blade to include adjustable blade seals between the blade body and nozzle housing.
4. The adjustable discharge blade pivot points shall utilize sealed bearings that are located outside of the airstream.
5. The nozzle assembly to include a factory supplied and mounted modulating electrical actuator to adjust nozzle discharge area. Actuator to be enclosed within a weatherproof cover.
6. Modulating electric actuator is 24V.

E. Fan Housing And Bypass Plenum:

1. Exhaust fan inlet venturi to include factory supplied, non-invasive flow monitoring system with differential pressure transducer.
2. Exhaust fan and bypass plenum assembly to include isolation damper with airfoil blades. Isolation damper to use a 24V, two-position actuator.
3. Bypass plenum to include a bypass damper with modulating actuator controlled by building management system.

F. Electrical Controls:

1. Fan manufacturer to include a variable frequency drive with bypass mode (Refer to 230514 “Variable Frequency Motor Controllers”) and integral nozzle controls.
2. Variable frequency drive to be matched with fan motor voltage and horsepower rating.
3. Fan speed, amps, and CFM to be viewable at the variable frequency drive user screen.
4. Variable frequency drive to be mounted within NEMA 3R enclosure and be suitable for indoor or outdoor installation with a maximum operating temperature of 40 degrees Centigrade.
5. Fan motor to include shaft grounding protection device to eliminate induced bearing currents.
6. Serial communication with building management system and/or bypass damper controller to be: BACnet MS/TP EIA 485 (standard communication), analog VDC signal (standard communication) BACnet communication.

7. Variable frequency drive controls to be controlled through the building management system. Sequence of operation for the variable nozzle system to be coordinated with the fan manufacturer and system controls provider.

a. BAS system controls shall be provided with the following Hardwired BAS connections from the LEF controller:

1) Differential pressure Input to LEF Controller from BAS system – AO
2) LEF status - DI
3) LEF power – DI
4) LEF Start/Stop – DO
5) LEF differential pressure set-point reset to LEF Controller from BAS system – AO
6) LEF CFM: AI
7) LEF Discharge Nozel position: AI
8) Bypass Damper Command: AI
9) VFD Communications Bacnet Interface
10) LEF Controller BAS Bacnet Interface

b. BAS system shall provide a Plenum static pressure sensor and associated re-transmission of that reading the LEF controller noted above.

G. Fan Impeller:

1. Fan impeller shall be centrifugal, backward inclined, with non-stall characteristics. The impeller shall be electronically balanced both statically and dynamically per AMCA Standard 204.
2. Fan impeller shall be manufactured of aluminum (AMCA type B spark resistant), fully welded and meet specification section 2.15 for corrosion resistant coating.

H. Fan Bypass Air Plenum:

1. For constant volume systems, the fan shall be connected directly to the exhaust duct without the need of a bypass air plenum.
2. For variable volume systems, a bypass air plenum shall be provided as shown on drawings. The plenum shall be equipped with a bypass air damper and intake air hood with bird screen for introducing outside air at roof level upstream of the fan.
3. The plenum shall be constructed of fully welded steel, meet specification section 2.15 for corrosion resistant coating, and mount on roof curb as shown on the project drawings. Plenums that are fabricated of plastics or resins that are combustible and have mechanical properties less than steel shall not be acceptable.
4. The bypass air plenum shall be mounted on factory fabricated roof curb provided by the fan manufacturer, as shown on the project drawings (see section 2.5)
5. Fan designs that use inlet flexible connectors that can leak causing loss of lab exhaust shall not be accepted.
6. Bypass air dampers shall be opposed-blade design, and coated with up to 4 mils of Hi-Pro Polyester resin, electrostatically applied and baked.
7. A fan isolation damper, either gravity back draft or two position actuated, fabricated of steel or aluminum and coated with minimum 4 mils of Hi-Pro

Polyester resin, electrostatically applied and baked, shall be provided as shown on the project documents.

8. Blower / Plenum vibration isolation shall be limited to neoprene / cork vibration pads.

I. Bypass Air Plenum Curb:

1. Exhaust system manufacturer shall supply a structural support curb for the plenum, of specified height, as shown on the drawings.
2. Curb shall be fabricated of a minimum of 14 gauge of galvanized corrosion resistant coated steel and structurally reinforced.
3. Curbs shall be insulated.
4. When properly anchored to the roof structure, the standard curb / plenum / blower assembly shall withstand wind loads of up to 125 mph without additional structural support.

J. Fan Motors And Drive:

1. Motors shall be premium efficiency, standard NEMA frame, 1800 or 3600 RPM, Totally Enclosed Fan Cooled (TEFC) with a 1.15 service factor. A factory-mounted NEMA 3R disconnect switch shall be provided for each fan. Motor maintenance shall be accomplished without fan impeller removal or requiring maintenance personnel to access the contaminated exhaust components.
2. Drive belts and sheaves shall be sized for 200% of the motor horsepower, and shall be readily and easily accessible for service, if required. Drive shall consist of a minimum of two belts under all circumstances.
3. Fan shaft to be turned and polished of 1040 steel material as standard, coated with corrosion resistant coating.
4. Fan shaft bearings shall be Air Handling Quality, ball or roller pillow block type and be sized for an L-10 life of no less than 100,000 hours. Bearings shall be fixed to the fan shaft using concentric mounting locking collars, which reduce vibration, increase service life, and improve serviceability. Bearings that use set screws shall not be allowed.
5. All shaft bearings shall have extended lube lines with Zerk fittings.

2.8 MOTORS

A. Comply with NEMA designation, temperature rating, service factor, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."

2.9 SOURCE QUALITY CONTROL

A. Sound-Power Level Ratings: Comply with AMCA 301, "Methods for Calculating Fan Sound Ratings from Laboratory Test Data." Factory test fans according to AMCA 300,

"Reverberant Room Method for Sound Testing of Fans." Label fans with the AMCA-Certified Ratings Seal.

B. Fan Performance Ratings: Establish flow rate, pressure, power, air density, speed of rotation, and efficiency by factory tests and ratings according to AMCA 210/ASHRAE 51, "Laboratory Methods of Testing Fans for Certified Aerodynamic Performance Rating."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install centrifugal fans level and plumb.

B. Disassemble and reassemble units, as required for moving to the final location, according to manufacturer's written instructions.

C. Lift and support units with manufacturer's designated lifting or supporting points.

D. Equipment Mounting:

1. Comply with requirements for vibration isolation and seismic control devices specified in Section 230548 "Vibration and Seismic Controls for HVAC."
2. Comply with requirements for vibration isolation devices specified in Section 230548.13 "Vibration Controls for HVAC."

E. Curb Support: Install roof curb on roof structure, level and secure, according to "The NRCA Roofing and Waterproofing Manual," Low-Slope Membrane Roofing Construction Details Section, Illustration "Raised Curb Detail for Rooftop Air Handling Units and Ducts." Install and secure centrifugal fans on curbs, and coordinate roof penetrations and flashing with roof construction. Secure units to curb support with anchor bolts.

F. Unit Support: Install centrifugal fans level on structural curbs or pilings. Coordinate wall penetrations and flashing with wall construction. Secure units to structural support with anchor bolts.

G. Isolation Curb Support: Install centrifugal fans on isolation curbs, and install flexible duct connectors and vibration isolation and seismic-control devices.

1. Comply with requirements in Section 233300 "Air Duct Accessories" for flexible duct connectors.
2. Comply with requirements in Section 230548.13 "Vibration Controls for HVAC for vibration isolation devices.

H. Install units with clearances for service and maintenance.

I. Label fans according to requirements specified in Section 230553 "Identification for HVAC Piping and Equipment."

3.2 CONNECTIONS

A. Drawings indicate general arrangement of ducts and duct accessories. Make final duct connections with flexible connectors. Flexible connectors are specified in Section 233300 "Air Duct Accessories."

B. Install ducts adjacent to fans to allow service and maintenance.

C. Install piping from scroll drain connection, with trap with seal equal to 1.5 times specified static pressure, to nearest floor drain with pipe sizes matching the drain connection.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. Verify that shipping, blocking, and bracing are removed.
2. Verify that unit is secure on mountings and supporting devices and that connections to ducts and electrical components are complete. Verify that proper thermal-overload protection is installed in motors, starters, and disconnect switches.
3. Verify that cleaning and adjusting are complete.
4. Disconnect fan drive from motor, verify proper motor rotation direction, and verify fan wheel free rotation and smooth bearing operation. Reconnect fan drive system, align and adjust belts, and install belt guards.
5. Adjust belt tension.
6. Adjust damper linkages for proper damper operation.
7. Verify lubrication for bearings and other moving parts.
8. Verify that manual and automatic volume control and fire and smoke dampers in connected ductwork systems are in fully open position.
9. See Section 230593 "Testing, Adjusting, and Balancing For HVAC" for testing, adjusting, and balancing procedures.
10. Remove and replace malfunctioning units and retest as specified above.

D. Test and adjust controls and safeties. Controls and equipment will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports.

3.4 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain centrifugal fans.

END OF SECTION 23 34 16

SECTION 23 36 00 - AIR TERMINAL UNITS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Shutoff, single-duct air terminal units.

1.3 PERFORMANCE REQUIREMENTS

A. Structural Performance: Hangers and supports shall withstand the effects of gravity loads and stresses within limits and under conditions described in SMACNA's "HVAC Duct Construction Standards - Metal and Flexible".

1.4 SUBMITTALS

A. Product Data: For each type of the following products, including rated capacities, furnished specialties, sound-power ratings, and accessories.

1. Air terminal units.
2. Liners and adhesives.
3. Sealants and gaskets.

B. Shop Drawings: For air terminal units. Include plans, elevations, sections, details, and attachments to other work.

1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
2. Wiring Diagrams: For power, signal, and control wiring.
3. Hangers and supports, including methods for duct and building attachment and vibration isolation.

C. Delegated-Design Submittal:

1. Materials, fabrication, assembly, and spacing of hangers and supports.
2. Design Calculations: Calculations for selecting hangers and supports.

D. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Ceiling suspension assembly members.
2. Size and location of initial access modules for acoustic tile.
3. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.

E. Operation and Maintenance Data: For air terminal units to include in emergency, operation, and maintenance manuals. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include the following:

1. Instructions for resetting minimum and maximum air volumes.
2. Instructions for adjusting software set points.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE Compliance: Applicable requirements in ASHRAE 62.1-2004, Section 5 - "Systems and Equipment" and Section 7 - "Construction and System Start-Up."

PART 2 - PRODUCTS

2.1 SHUTOFF, SINGLE-DUCT AIR TERMINAL UNITS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Carrier
2. Price Industries.
3. Trane; a business of American Standard Companies.
4. Titus.

B. Configuration: Volume-damper assembly inside unit casing with control components inside a protective metal shroud.

C. Casing: 0.034-inch steel, single wall.

1. Casing Lining: 22 gauge galvanized steel casing and valve with 1” foil faced backed insulation.
2. Air Inlet: Round stub connection or S-slip and drive connections for duct attachment.
3. Air Outlet: S-slip and drive connections.

4. Access: Removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket.
5. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

D. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.

1. Maximum Damper Leakage: ARI 880 rated, 2 percent of nominal airflow at 3-inch wg inlet static pressure.
2. Damper Position: Normally open.

E. Attenuator Section: 0.034-inch steel sheet. (if required to comply with acoustic performance)

1. Lining: Adhesive attached, 3/4-inch-thick, polyurethane foam insulation complying with UL 181 erosion requirements, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.

a. Cover liner with nonporous foil.

2. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

F. Velocity Sensors: Multipoint array with velocity sensors in air inlets.

G. Electric-Resistance Heating Coils: Nickel-chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with primary automatic, and secondary manual, reset thermal cutouts. Terminate elements in stainless-steel, machine-staked terminals secured with stainless-steel hardware.

1. Access door interlocked disconnect switch.
2. Downstream air temperature sensor with local connection to override discharge-air temperature to not exceed a maximum temperature set point (adjustable.)
3. Nickel chrome 80/20 heating elements.
4. Airflow switch for proof of airflow.
5. Fuses in terminal box for overcurrent protection (for coils more than 48 A).
6. Contactors and SCR control.

H. Electric Controls: Damper actuator and thermostat.

1. Damper Actuator: 24 V, powered closed, spring return open.
2. Thermostat: Wall-mounted electronic type with digital display, temperature display in Fahrenheit and Celsius, and space temperature set point.

I. Low Voltage Transformer: Box manufacturer shall provide transformers as necessary for control of air terminal units without electric heat.

J. Direct Digital Controls: Single-package unitary controller and actuator specified in Section 230923 "Direct Digital Control (DDC) System for HVAC."

2.2 PARALLEL FAN POWERED AIR TERMINAL UNITS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Carrier
2. Price Industries.
3. Trane; a business of American Standard Companies.
4. Titus.

B. Configuration: Volume-damper assembly and fan in parallel arrangement inside unit casing with control components inside a protective metal shroud.

C. Casing: 0.034-inch steel, single wall.

1. Casing Lining: 22 gauge galvanized steel casing and valve with 1” foil faced backed insulation.
2. Air Inlet: Round stub connection or S-slip and drive connections for duct attachment.
3. Air Outlet: S-slip and drive connections.
4. Access: Removable panels for access to parts requiring service, adjustment, or maintenance; with airtight gasket.
5. Fan: Forward-curved centrifugal, located at plenum air inlet
6. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

D. Volume Damper: Galvanized steel with peripheral gasket and self-lubricating bearings.

1. Maximum Damper Leakage: ARI 880 rated, 2 percent of nominal airflow at 3-inch wg inlet static pressure.
2. Damper Position: Normally open.

E. Velocity Sensors: Multipoint array with velocity sensors in air inlets.

F. Motor:

1. Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements for motors specified in Section 230513 "Common Motor Requirements for HVAC Equipment."
2. Type: Electronically commutated motor with local speed adjustment knob.

3. Fan-Motor Assembly Isolation: Rubber isolators.
4. Efficiency: Premium efficient.

G. Filters: Minimum arrestance according to ASHRAE 52.1 and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2.

1. Material: Pleated cotton-polyester media having 90 percent arrestance and 7 MERV.
2. Thickness: 1 inch.

H. Attenuator Section: 0.034-inch steel sheet.

1. Lining: Adhesive attached, 3/4-inch-thick, polyurethane foam insulation complying with UL 181 erosion requirements, and having a maximum flame-spread index of 25 and a maximum smoke-developed index of 50, for both insulation and adhesive, when tested according to ASTM E 84.

   a. Cover liner with nonporous foil.

2. Airstream Surfaces: Surfaces in contact with the airstream shall comply with requirements in ASHRAE 62.1-2004.

I. Electric-Resistance Heating Coils: Nickel-chromium heating wire, free of expansion noise and hum, mounted in ceramic inserts in a galvanized-steel housing; with primary automatic, and secondary manual, reset thermal cutouts. Terminate elements in stainless-steel, machine-staked terminals secured with stainless-steel hardware.

1. Access door interlocked disconnect switch.
2. Downstream air temperature sensor with local connection to override discharge-air temperature to not exceed a maximum temperature set point (adjustable.)
3. Nickel chrome 80/20 heating elements.
4. Airflow switch for proof of airflow.
5. Fuses in terminal box for overcurrent protection (for coils more than 48 A).
6. Contactors and SCR control.

J. Factory-Mounted and -Wired Controls: Electrical components mounted in control box with removable cover. Incorporate single-point electrical connection to power source.

1. Control Transformer: Factory mounted for control voltage on electric and electronic control units with terminal strip in control box for field wiring of thermostat and power source.
2. Wiring Terminations: Fan and controls to terminal strip. Terminal lugs to match quantities, sizes, and materials of branch-circuit conductors. Enclose terminal lugs in terminal box that is sized according to NFPA 70.
3. Disconnect Switch: Factory-mounted, fuse type.

K. Control Panel Enclosure: NEMA 250, Type 1, with access panel sealed from airflow and mounted on side of unit.

L. Electric Controls: Damper actuator and thermostat.

1. Damper Actuator: 24 V, powered closed, spring return open.
2. Thermostat: Wall-mounted electronic type with digital display, temperature display in Fahrenheit and Celsius, and space temperature set point.

M. Low Voltage Transformer: Box manufacturer shall provide transformers as necessary for control of air terminal units without electric heat.

N. Direct Digital Controls: Single-package unitary controller and actuator specified in Section 230923 "Direct Digital Control (DDC) System for HVAC."

2.3 HANGERS AND SUPPORTS

A. Hanger Rods for Noncorrosive Environments: Cadmium-plated steel rods and nuts.

B. Hanger Rods for Corrosive Environments: Electrogalvanized, all-thread rods or galvanized rods with threads painted with zinc-chromate primer after installation.

C. Steel Cables: Galvanized steel complying with ASTM A 603.

D. Steel Cable End Connections: Cadmium-plated steel assemblies with brackets, swivel, and bolts designed for duct hanger service; with an automatic-locking and clamping device.

E. Air Terminal Unit Attachments: Sheet metal screws, blind rivets, or self-tapping metal screws; compatible with duct materials.

F. Trapeze and Riser Supports: Steel shapes and plates for units with steel casings; aluminum for units with aluminum casings.

2.4 SOURCE QUALITY CONTROL

A. Factory Tests: Test assembled air terminal units according to ARI 880.

1. Label each air terminal unit with plan number, nominal airflow, maximum and minimum factory-set airflows, coil type, and ARI certification seal.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install air terminal units according to NFPA 90A, "Standard for the Installation of Air Conditioning and Ventilating Systems."

B. Install air terminal units level and plumb. Maintain sufficient clearance for normal service and maintenance.

C. Install wall-mounted thermostats.

3.2 HANGER AND SUPPORT INSTALLATION

A. Comply with SMACNA's "HVAC Duct Construction Standards - Metal and Flexible," Chapter 4, "Hangers and Supports."

B. Building Attachments: Concrete inserts, powder-actuated fasteners, or structural-steel fasteners appropriate for construction materials to which hangers are being attached.

1. Where practical, install concrete inserts before placing concrete.
2. Install powder-actuated concrete fasteners after concrete is placed and completely cured.
3. Use powder-actuated concrete fasteners for standard-weight aggregate concretes and for slabs more than 4 inches thick.
4. Do not use powder-actuated concrete fasteners for lightweight-aggregate concretes and for slabs less than 4 inches thick.

C. Hangers Exposed to View: Threaded rod and angle or channel supports.

D. Install upper attachments to structures. Select and size upper attachments with pull-out, tension, and shear capacities appropriate for supported loads and building materials where used.

3.3 CONNECTIONS

A. Install piping adjacent to air terminal unit to allow service and maintenance.

B. Connect ducts to air terminal units according to Division 23 Section "Metal Ducts."

C. Make connections to air terminal units in accordance with manufactures minimum inlet straight length of duct diameter requirements. Contractor shall coordinate Terminal unit layout to comply with manufactures inlet requirements. Refer to manufactures installation guidelines for minimum inlet dimensions.

3.4 IDENTIFICATION

A. Label each air terminal unit with plan number, nominal airflow, and maximum and minimum factory-set airflows. Comply with requirements in Division 23 Section "Identification for HVAC Piping and Equipment" for equipment labels and warning signs and labels.

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Tests and Inspections:

1. After installing air terminal units and after electrical circuitry has been energized, test for compliance with requirements.
2. Leak Test: After installation, fill water coils and test for leaks. Repair leaks and retest until no leaks exist.
3. Operational Test: After electrical circuitry has been energized, start units to confirm proper motor rotation and unit operation.
4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

C. Air terminal unit will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.6 STARTUP SERVICE

A. Perform startup service.

1. Complete installation and startup checks according to manufacturer's written instructions.
2. Verify that inlet duct connections are as recommended by air terminal unit manufacturer to achieve proper performance.
3. Verify that controls and control enclosure are accessible.
4. Verify that control connections are complete.
5. Verify that nameplate and identification tag are visible.
6. Verify that controls respond to inputs as specified.

3.7 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain air terminal units.

B. Provide 4 hours of instruction to be conducted at the project site with manufacturer's representative. The training shall be conducted at 2 sessions at 2 hour a piece. Contractor to also provide two sets of control operation manuals for use at the training session and then provide to the Owner after completion of the session.

3.8 COMMISSIONING

A. Refer to Commissioning Specifications for related commissioning requirements.

B. Contractor shall provide all necessary support to the commissioning team to implement commissioning plan.

3.9 WARRANTY

A. The manufacturer shall provide a minimum 2 year parts and labor warranty.

END OF SECTION 23 36 00

SECTION 23 37 13 - DIFFUSERS, REGISTERS, AND GRILLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Ceiling diffusers.
2. Ceiling Linear Slot Outlets.
3. Registers and Grilles.

B. Related Sections:

1. Division 08 Section "Operable Wall Louvers" and Section "Fixed Louvers" for fixed and adjustable louvers and wall vents, whether or not they are connected to ducts.
2. Division 23 Section "Air Duct Accessories" for fire and smoke dampers and volume-control dampers not integral to diffusers, registers, and grilles.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated, include the following:

1. Data Sheet: Indicate materials of construction, finish, and mounting details; and performance data including throw and drop, static-pressure drop, and noise ratings.
2. Diffuser, Register, and Grille Schedule: Indicate drawing designation, room location, quantity, model number, size, and accessories furnished.

1.4 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from Installers of the items involved:

1. Ceiling suspension assembly members.

2. Method of attaching hangers to building structure.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
5. Duct access panels.

PART 2 - PRODUCTS

2.1 CEILING DIFFUSERS

A. Ceiling Diffusers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Anemostat Products; a Mestek company.
   b. Carnes.
   c. METALAIRE, Inc.
   d. Price Industries.
   e. Titus.

2. Devices shall be specifically designed for variable-air-volume flows.
3. Material: Aluminum.
4. See Schedule on drawings for Finish, Face Style, Mounting, Pattern, and Accessories.

2.2 CEILING LINEAR SLOT OUTLETS

A. Linear Slot/Bar Diffusers:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Anemostat Products; a Mestek company.
   b. Carnes.
   c. METALAIRE, Inc.
   d. Price Industries.
   e. Titus.

2. Devices shall be specifically designed for variable-air-volume flows.
3. Material: Aluminum.
4. See Schedule on drawings for Finish, Face Style, Mounting, Pattern, and Accessories.

2.3 REGISTERS AND GRILLES

A. Adjustable Bar Register/Grilles:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. Anemostat Products; a Mestek company.
   b. Carnes.
   c. METALAIRE, Inc.
   d. Price Industries.
   e. Titus.

2. Devices shall be specifically designed for variable-air-volume flows.
3. Material: Aluminum.
4. See Schedule on drawings for Finish, Face Style, Mounting, Pattern, Blade Arrangement, Frame, and Accessories.

2.4 SOURCE QUALITY CONTROL

A. Verification of Performance: Rate diffusers, registers, and grilles according to ASHRAE 70, "Method of Testing for Rating the Performance of Air Outlets and Inlets."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas where diffusers, registers, and grilles are to be installed for compliance with requirements for installation tolerances and other conditions affecting performance of equipment.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install diffusers, registers, and grilles level and plumb.

B. Ceiling-Mounted Outlets and Inlets: Drawings indicate general arrangement of ducts, fittings, and accessories. Air outlet and inlet locations have been indicated to achieve design requirements for air volume, noise criteria, airflow pattern, throw, and pressure drop. Make final locations where indicated, as much as practical. For units installed in lay-in ceiling panels, locate units in the center of panel. Where architectural features or other items conflict with installation, notify Architect for a determination of final location.

C. Install diffusers, registers, and grilles with airtight connections to ducts and to allow service and maintenance of dampers, air extractors, and fire dampers.

3.3 ADJUSTING

A. After installation, adjust diffusers, registers, and grilles to air patterns indicated, or as directed, before starting air balancing.

END OF SECTION 23 37 13

SECTION 23 41 00 - PARTICULATE AIR FILTRATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Disposable panel filters.
2. Filter gages.
3. Bipolar Ionization

1.3 REFERENCES

A. Air-Conditioning and Refrigeration Institute:

1. ARI 850 - Commercial and Industrial Air Filter Equipment.

B. American Society of Heating, Refrigerating and Air-Conditioning Engineers:

1. ASHRAE 52.1 - Gravimetric and Dust-Spot Procedures for Testing Air-Cleaning Devices Used in General Ventilation for Removing Particulate Matter.

C. Military Standardization Documents:

1. MIL MIL-STD-282 - Filter Units, Protective Clothing, Gas-Mask Components, and Related Products: Performance-Test Methods.

D. Underwriters Laboratories Inc.:

1. UL 586 - High-Efficiency. Particulate, Air Filter Units.
2. UL 867 - Electrostatic Air Cleaners.
3. UL 900 - Air Filter Units.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include dimensions; operating characteristics; required clearances and access; rated flow capacity, including initial and final pressure drop at rated airflow; efficiency and test method; fire classification; furnished specialties; and accessories for each model indicated.

B. Shop Drawings: For air filters. Include plans, elevations, sections, details, and attachments to other work.

1. Show filter rack assembly, dimensions, materials, and methods of assembly of components.
2. Include setting drawings, templates, and requirements for installing anchor bolts and anchorages.
3. Wiring Diagrams: For power, signal, and control wiring.

C. Operation and Maintenance Data: For each type of filter and rack to include in emergency, operation, and maintenance manuals.

1.5 QUALITY ASSURANCE

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. ASHRAE Compliance:

1. Comply with applicable requirements in ASHRAE 62.1, Section 4 - "Outdoor Air Quality"; Section 5 - "Systems and Equipment"; and Section 7 - "Construction and Startup."
2. Comply with ASHRAE 52.1 for arrestance and ASHRAE 52.2 for MERV for methods of testing and rating air-filter units.

C. Comply with NFPA 90A and NFPA 90B.

1.6 COORDINATION

A. Coordinate sizes and locations of concrete bases. Cast anchor-bolt inserts into bases.

1.7 REPLACEMENT OF MATERIAL DURING CONSTRUCTION

A. Furnish extra materials that will replace filtration during and at the completion of construction.

1. During the construction phase, filters must be replaced when the pressure drop exceeds 1/2” of water column.

2. All filters will be replaced on the day of final completion. Two (2) additional sets of filters must be provided.

1.8 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Provide two complete sets of pre-filters for each filter bank.

PART 2 - GENERAL

2.1 DISPOSABLE PANEL FILTERS

A. Description: Factory-fabricated, dry, extended-surface filters with stainless steel holding frames.

B. Manufacturers:

1. Tridem.
2. Camfil-Farr.
3. American Air Filter.

C. Media: Synthetic glass fibrous material and other media pleated, UL Class II, 25-30 percent efficiency (MERV 8) formed into deep-V-shaped pleats and held by self-supporting wire grid.

1. Nominal Size: 24 x 24 inches.
2. Thickness: 1 or 2 inch.

D. Media and Media-Grid Frame: Nonflammable glass fiber, synthetics and other media to ensure adequacy for jet fuel.

E. Performance Rating:

1. Face Velocity: 500 fpm
2. Initial Resistance: 0.15 inch wg
3. Recommended Final Resistance: 0.50 inches wg.

F. Duct-Mounting Frames: Stainless steel with gaskets and fasteners, and suitable for bolting together into built-up filter banks.

1. Manufacturer:

a. Pyramid Filters,

b. Perkins Thermal Systems.
c. Guru Filtration System.

2.2 FILTER GAGES

A. Manufacturers:

1. Dwyer.
2. Trerice.
3. Weiss.

B. Direct Reading Dial: 3-1/2 inch diameter diaphragm actuated dial in metal case. Furnish vent valves, black figures on white background, front calibration adjustment, range 0-3.0 inch wg 2 percent of full scale accuracy.

C. Accessories: Static pressure tips with integral compression fittings, 1/4 inch plastic tubing, 2-way or 3-way vent valves.

2.3 BIPOLAR IONIZATION

A. Manufacturers

1. Aerisa.
2. BioClimatic
3. Global Plasma Solutions
4. Plasma Air International.

B. Performance Criteria

1. The bipolar ionization system shall be capable of controlling gas phase contaminants generated from human occupants as well as products of combustion of jet fuel.
2. Capable of reducing static space charges.
3. Capable of reducing common VOC’s encountered in schools, office buildings and commercial facilties.
4. Equipment shall be capable of performing in non condensing atmospheres at temperatures up to 140 degrees F.
5. Provide 5 year warranty.

C. Equipment Requirements

1. The bipolar ionization units shall include all power supplies, ion generating tubes, gaskets, indicators, switches, fuses, and accessories necessary for safe an deficient operation.

2. All duct mounted applications shall include a mounting frame permanently attached to the duct. Ionization units shall be attached to the mounting frame.
3. Ionization Tubes shall be UL or ETL listed and bear the UL or ETL mark.
4. The manufacturer shall provide ionization tubes of appropriate size and quantity for each air handling system to meet the requirements for the system.
5. All exposed metallic parts of ionization tubes shall be stainless steel.
6. Ionization units shall be suitable for duct mounting or air handling unit plenum mounting.
7. Ionization units shall be plenum rated per UL 2043.
8. Ionization unit output shall be user adjustable from approximately 50-100%. There shall be a minimum of five levels of adjustment.
9. An integral differential pressure switch shall be provided on duct mounted one- and two-tube units. Additional controls such as field mounted pressure switches or control relays shall be included as part of the ionization equipment scope.

D. Installation Requirements

1. Ionization units shall be installed per manufacturer's installation instructions.

E. Electrical Requirements:

1. The electrical power wiring to the ionization units shall be detached without the use of tools to facilitate servicing of the equipment.
2. Ionization units shall be available for 120 and 240 volt applications.
3. The maximum power required for multi tube ionization units shall be 50 watts.
4. The electrical contractor shall provide shall a junction box with single outlet within 4 feet of the ionization equipment.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install filters with felt, rubber, or neoprene gaskets to prevent passage of unfiltered air around filters.

B. Install filter-gage, static-pressure taps upstream and downstream from filters. Install filter gages on filter banks with separate static-pressure taps upstream and downstream from filters. Mount filter gages on outside of filter housing or filter plenum in an accessible position. Adjust and level inclined gages.

C. Do not operate fan system until temporary filters are in place. Replace temporary filters used during construction and testing, with clean set.

D. Install filter gages on filter banks with separate static pressure tips upstream and downstream of filters.

E. Install filters in accordance with manufacturer’s recommendations.

F. Position each filter unit with clearance for normal service and maintenance. Anchor filter holding frames to substrate.

G. Install filters in position to prevent passage of unfiltered air.

H. Coordinate filter installations with duct and air-handling-unit installations.

I. Provide maintenance training to University of Central Florida, as required.

3.2 FIELD QUALITY CONTROL

A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Perform tests and inspections.

1. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect components, assemblies, and equipment installations, including connections, and to assist in testing.

C. Air filter will be considered defective if it does not pass tests and inspections.

D. Prepare test and inspection reports.

3.3 CLEANING

A. After completing system installation and testing, adjusting, and balancing of air-handling and air-distribution systems, clean filter housings and install new filter media.

3.4 COMMISSIONING

A. Refer to Commissioning Specifications for related commissioning requirements.

B. Contractor shall provide all necessary support to the commissioning team to implement commissioning plan.

END OF SECTION 23 41 00

SECTION 23 74 13 - PACKAGED OUTDOOR CENTRAL-STATION AIR-HANDLING UNITS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section

1.02 SUMMARY

A. General: This Section includes packaged, outdoor, central-station air-handling units (rooftop units) with the following components and accessories:

1. Direct-expansion cooling.
2. Outdoor- and return-air damper section.
3. Roof curbs

1.03 DEFINITIONS

A. DDC: Direct-digital controls.

B. RTU: Rooftop unit. As used in this Section, this abbreviation means packaged, outdoor, central-station air-handling units. This abbreviation is used regardless of whether the unit is mounted on the roof or on a concrete base on ground.

C. Supply-Air Fan: The fan providing supply air to conditioned space. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.

D. Supply-Air Refrigerant Coil: Refrigerant coil in the supply-air stream to absorb heat (provide cooling) during cooling operations and to reject heat (provide heating) during heating operations. "Supply air" is defined as the air entering a space from air-conditioning, heating, or ventilating apparatus.

1.04 SUBMITTAL

A. General: Refer to paragraph entitled "SUBMITTAL" in Section 15010. Include the following data:

1. Manufacturers Literature:

a. Dimensional outline drawing showing the operating weights of the outdoor packaged equipment, the roof curb, all connection locations, and the distribution of the weight to the structure.

2. Performance Data:

   a. Provide the following information for each type and size of packaged air conditioning unit:

      (1) Sensible and total cooling capacities at the indicated design conditions.
      (2) Total heating capacity at indicated design conditions.
      (3) Airflow and airside pressure loss at design operating conditions.
      (4) Motor horsepower (or Watts), voltage and phase

3. Installation Instructions:

   a. Manufacturer's printed installation instructions for each type of packaged air conditioning unit indicated, including copies shipped with the equipment.

4. Maintenance Instructions:

   a. Manufacturer's printed maintenance instructions for each type of packaged air conditioning unit indicated.

1.05 APPLICABLE STANDARDS

A. General: All equipment, material, accessories, methods of construction and reinforcement, finish quality, workmanship and installation shall be in compliance with the paragraph entitled "Code Compliance" in Section 15010.

B. Comply: With the National Fire Protection Association (NFPA) Standards and other Codes and Standards as adopted by the Local Authority having Jurisdiction.

C. NFPA: Insulation and adhesive shall meet the flame spread and smoke generation requirements of NFPA-90A, 2002 Revision.

D. NFPA 90 A & B: Installation of Air Conditioning and Ventilation Systems and Installation of Warm Air Heating and Air Conditioning Systems.

E. ASHRAE: Packaged units shall be designed to conform to ASHRAE 15-92.

F. UL and CSA: Units shall be UL Listed and CSA Certified as a total package.

G. NRCA: Roof curbs where indicated shall be designed to conform to NRCA Standards.

H. ARI: Capacities shall be rated in accordance with ARI Standard 210/240-89 or ARI Standard 360-86.

1.06 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace components of RTUs that fail in materials or workmanship within specified warranty period.

1. Warranty Period for Compressors: Manufacturer's standard, but not less than five years from date of Substantial Completion.
2. Warranty Period for Control Boards: Manufacturer's standard, but not less than three years from date of Substantial Completion.

PART 2 - PRODUCTS

2.01 MANUFACTURER

A. General: Each unit shall comply with the requirements as indicated above and the following additional specific requirements.

1. Manufacturer:

a. York
b. Daikin
c. Trane

B. General: The packaged equipment shall be specifically manufactured for outdoor applications. Capacity and energy efficiency shall not be less than indicated. The air entering the condenser shall be 115 degrees F. unless otherwise indicated. Each unit shall be factory assembled and factory tested.

C. Cabinet: The cabinet shall be constructed of 16 gauge double wall galvanized steel with foam injected insulation of thermal resistance R-13. Design of the cabinet shall allow access to compressor and all electrical connections. Asphalt or epoxy coating shall prevent water from reaching steel on the interior of the base bottom. Cabinet parts shall be cleaned and coated with zinc-phosphate or another suitable preparation, then painted with a baked enamel finish. All exterior hardware (nuts, bolts, screws, washers) shall be stainless steel. The roof of the cabinet shall be sloped to gutters to prevent rainwater from running down the sides of the unit.

D. Fans and Motors:

1. Condenser Fans: The condenser air fans shall be steel propeller type, dynamically balanced and direct-driven by a fan motor with pre-lubricated sealed ball bearings and built-in thermal overload protection. The condenser air discharge shall be provided with a vinyl coated or galvanized steel fan guard.
2. Evaporator Fan: The indoor fan shall be statically and dynamically balanced direct drive plenum and shall be made of galvanized steel. Blower wheel shall

be mounted on a solid steel shaft supported by sealed ball bearings or regreasable-type with lubrication lines extended to the outside of the cabinet. Blower motors shall have pre-lubricated sealed ball bearings. The fan assembly shall be completely isolated from vibration.

3. Fan Motor: Comply with requirements in Section 230513 "Common Motor Requirements for HVAC Equipment."

E. Compressors:

1. Type: Scroll compressors, refer to drawings for quantity and type of compressors.
2. Mounting: Compressors shall be provided with neoprene isolators and internal spring mounting on independent dedicated rails for vibration isolation.

F. Coils: The condenser and evaporator coils shall be aluminum plate-finned formed on multiple rows of seamless copper tubing arranged in a staggered tube configuration and leak-tested to 300 psig. Exterior coils shall be protected by coil guards of galvanized or vinyl coated steel.

G. Condensate Drain Pan: The insulated condensate drain pan shall be stainless steel coated with corrosion-resistant elastomeric-based material. The insulation shall be a minimum of 1 inch thick fiberglass. Threaded pipe connections shall be provided on one side only and the pan shall slope toward the connection to prevent standing water.

H. Condensate Drain Pan: The insulated condensate drain pan shall be stainless steel. The insulation shall be a minimum of 1 inch thick fiberglass. Threaded pipe connections shall be provided on one side only and the pan shall slope toward the connection to prevent standing water.

I. Outdoor Air Intake: The outdoor air intake opening shall be covered by a rain hood with a 1/2" galvanized wire mesh bird screen. Provide motorized outside air damper.

J. Airflow Measurement shall meet requirements outlined in specification section 23 0993.

K. Refrigerant Components: Included in the HCFC-22 refrigerant circuit shall be a condenser fan cycling head pressure control, accumulator, filter-drier, high pressure safety control (manual-reset), low pressure safety control/loss of charge protector (auto-reset), dual gauge connections for high and low pressure readings, sight glass-moisture indicator, and thermal-expansion valve. The expansion valve shall have adjustable superheat and distributors to meter the refrigerant evenly to the evaporator refrigerant circuits. Provide Schrader-type valve assembly with threaded cap for both liquid and suction lines to permit field-testing and recharging.

L. Controls and Safeties:

1. General: Internally wired controls shall include the compressor anti-short cycle timer, fan, blower and compressor motor contactors or starters mounted in a gasketed sheet metal control panel. The control circuit shall include a 24-volt transformer and low voltage terminal board.
2. Cooling Control: Cooling shall be controlled by a factory-installed ambient thermostat. The compressor shall start on demand when the outside air temperature is above 25 degrees F.
3. Blower Operation: Blower operation shall be continuous. Leaving air temperature will be maintained by unloading the compressor.
4. Power Supply Safeties: Phase loss and low voltage safety monitor automatically stops the unit whenever a phase is lost, or when voltage level drops too low. Restart is automatic, with time delay when proper power supply conditions are restored.

M. Power Wiring: The unit shall be provided with factory-installed branch circuiting for a single point of termination requiring only one field connection for power wiring. Blower fans, compressor motor, and condenser fan circuits shall be individually fused.

N. Dampers: Outdoor- and Return-Air Mixing Dampers: Parallel- or opposed-blade galvanized-steel dampers mechanically fastened to cadmium plated for galvanized-steel operating rod in reinforced cabinet. Connect operating rods with common linkage and interconnect linkages so dampers operate simultaneously.

1. Damper Motor: Modulating with adjustable minimum position.
2. Relief-Air Damper: Gravity actuated or motorized, as required by ASHRAE/IESNA 90.1, with bird screen and hood.

O. Filters: Minimum arrestance according to ASHRAE 52.1, and a minimum efficiency reporting value (MERV) according to ASHRAE 52.2

1. Pleated: Minimum 90 percent arrestance, and MERV 8 Pre-Filters.
2. Cartridge: Minimum 90 percent arrestance, and MERV 13 Final-Filters.

P. Accessories:

1. Duplex, 115-V, ground-fault-interrupter outlet with 15-A overcurrent protection. Include transformer if required. Outlet shall be energized even if the unit main disconnect is open.
2. Filter differential pressure switch with sensor tubing on either side of filter. Set for final filter pressure loss.

Q. Roof Curbs:

1. Roof curbs with vibration isolators and wind or seismic restraints are specified in Section 230548 "Vibration and Seismic Controls for HVAC Piping and Equipment."
2. Curb Height: Minimum 24 inches
3. Roof curb shall be insulated with plenum for return path.

PART 3 - EXECUTION

3.01 GENERAL

A. Placement: The location shall be as shown; however, actual placement shall be verified using field measurements and data relating to the equipment accepted for actual installation on the project in order to avoid conflict with the structure and the access to or location of other equipment.

B. Clearance: Layout and carefully install units with sufficient clearances to permit proper maintenance. The space required shall be as recommended by the manufacturer including the space required for removal of the coils for maintenance. The outdoor intake shall be a minimum of 10 feet horizontal distance from any exhaust discharge or plumbing vent.

C. EMS Control Wiring: Install daisy-chain communications/control wiring link to each unit for energy management system interface. Coordinate with manufacturer for wiring termination location and requirements. Wiring shall be shielded twisted two pair copper conductor, minimum 18 gauge.

D. Coordination: Coordinate with ductwork, electrical connections and controls for a neat workmanlike installation and clear access for set-up and maintenance of unit.

E. Provide a trapped condensate drain piping system extending independently from each RTU to the nearest roof drain. Secure piping to roof with prefabricated weatherproof sleepers.

F. Secure RTU to roof curb and adhere to current hurricane codes regarding roof tie-in and wind resistance.

END OF SECTION 23 07 19

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Project drawings and general provisions of the Contract, including but not limited to all; General and Supplementary Conditions, Division 01 through 28 Specification Sections, apply to this Section.

1.2 SUMMARY

A. All electrical and associated work is shown and described in and on the following contract documents:

1. Contract Drawings.
2. Contract Specifications.
3. Working and shop drawings furnished by the contractor, subcontractors, installers, suppliers and vendors.
4. Any electrical work as required to complete the installation and testing of all equipment furnished under this contract and required by various safety codes.

1.3 MATERIALS

A. No materials of any kind shall be used that have not been approved by the Underwriters Laboratories, Inc., where UL provides such service, and each piece of equipment shall have marked thereon, where it can readily be observed, the name or trademark of the manufacturer.

B. Materials and equipment shall be the best of their several kinds and all work shall be performed in a neat, substantial and workmanlike manner, to the satisfaction of the Owner.

1.4 DEFECTIVE MATERIALS AND EQUIPMENT

A. Defective material and equipment or materials and equipment damaged in the course of installation or test shall be replaced or repaired in a manner meeting the approval of the Owner. All materials and workmanship shall be of the best quality and all work done in a thorough manner in strict accordance with the rules and regulations of the Fire Underwriters, the state, and power.

1.5 MATERIAL AND EQUIPMENT INSTALLATION

A. All items shall be installed in accordance with the manufacturer's recommendations. The Contractor shall furnish and install all material and hardware required for mounting and to provide a complete and functional installation, at no additional cost to the Owner.

1.6 CLEANING AND TOUCH-UP PAINTING

A. The premises shall be kept free from accumulation of waste material and rubbish. Upon completion of work, the contractor shall remove materials, scraps, and debris from the site. Scratches, scrapes, or chips in interior or exterior surfaces of devices shall be touched-up with finishes matching as nearly as possible the type and color of the original finish.

1.7 PROJECT CONDITIONS

A. Conditions Affecting Selective Demolition: The following project conditions apply:

1. Protect adjacent materials indicated to remain. Install and maintain dust and noise barriers to keep dirt, dust, and noise from being transmitted to adjacent areas. Remove protection and barriers after demolition operations are complete.

1.8 SEQUENCING AND SCHEDULING

A. Coordinate the shut-off and disconnection of electrical service with the Owner.

B. Notify the Owner at least 10 days prior to commencing demolition operations.

C. Coordinate door, barrier and wall demolition and replacement with respect for and Owner approval of area security requirements.

1.9 INSUFFICIENT INSTRUCTION

A. The Contractor shall furnish and install all materials and equipment that are obviously part of the complete electrical installation and without any additional charge to the Owner.

B. If, in the opinion of the Contractor, any work shown on the Drawings or called for under these Specifications is insufficiently specified or specified in such a manner as to make it impossible for him to produce first-class work which will meet the approval of the Owner, he shall refer same to the Owner before proceeding with the work and, if he fails to refer such instances to the Owner, no excuse for poor workmanship will be entertained.

1.10 FIELD ENGINEERING

A. Where existing conditions and dimensions are shown or indicated on the Contract Drawings, the information given is approximate only, and is not warranted by the Owner to be either complete or correct. The Contractor shall verify actual existing conditions and dimensions in the field before ordering materials or starting construction.

B. The Contract Drawings indicate the general location and arrangement of conduit,

wiring devices, equipment, and other products. The Contractor shall adjust the indicated locations (subject to approval in the field) as necessary to:

1. Comply with all applicable code requirements.
2. Permit access for construction, inspection, testing, operation, and maintenance.
3. Avoid conflict with pipes, mechanical equipment, structural openings (e.g., doors), and other obstructions, existing or provided under this contract, whether or not as shown on the Contract Drawings.
4. Produce a neat, workmanlike arrangement.

C. The Contractor shall determine the proper connection points for all power, control, and signal wiring, regardless of whether the connection points are in equipment furnished under this Contract or in existing equipment.

D. The Owner will make available to the Contractor any reference drawings it may have. However, the Owner does not guarantee the correctness, completeness, or availability of reference drawings. Should the Contractor choose to rely upon the reference drawings, he does so at his own risk.

E. The Contractor shall perform all field surveys, wire tracing, and other work required to ascertain the proper connection points for all wiring.

F. The Contractor shall coordinate the making and sealing of all holes through structure to accommodate electrical conduits and supports for electrical equipment, and shall submit working drawings thereof for the Owner's approval.

G. Use cable and conduit locating tools and devices to locate conduits in floor slabs and under the ground before core drilling and excavation.

1.11 CONTINUITY OF ELECTRICAL SERVICE AND TEMPORARY ELECTRIC CONNECTIONS

A. Written consent from the Owner must be obtained not less than 10 days prior to carrying out any portion of the work included in this Contract that requires interruption of electrical service.

B. All service shutdowns shall be scheduled and shall be part of the Project Construction Schedule.

C. The Owner reserves the right to revoke the granting of any shutdown whether scheduled or unscheduled at any time.

1.12 REMOVAL AND RELOCATIONS

A. Where existing materials and equipment are to be removed or relocated, all materials no longer used shall be removed unless otherwise directed by the Owner. Affected surfaces shall be repaired to conform to the type, quality, and finish of the surrounding

surface in a neat and work manlike manner.

B. Contractor shall provide circuit tags to identify both temporary and permanent power circuits. It is imperative that the phase rotation of all three phase motors is identified both before and after all modifications; this must be verified as complete prior to energizing. Label the phase rotation locally as CW or CCW for Owner use. Post an accurate temporary single line to aid emergency personnel during the course of the project.

C. Where existing switchgear units, power distribution boards, and control panels are to be removed or temporarily disconnected, the Contractor shall first identify and label all wiring which will be re-utilized. No wires shall be disconnected which have not been properly identified. Existing switch gear units, power distribution boards, and control panels shall be removed in an orderly fashion in order to minimize airport disruptions.

D. Provide working drawings, including plans, elevations, one-line diagrams and the like, in accordance with the contract documents.

1.13 ELECTRICAL REQUIREMENTS FOR REPLACEMENT OF EQUIPMENT

A. Where existing equipment is shown to be removed and replaced as part of the project scope, and electrical circuiting is to be re-used, Contractor shall be responsible for verifying/identifying the panel and circuit feeding the equipment, de-energizing the circuit during demolition and replacement, and, where the same circuit(s) are indicated to be re-used, megger testing the existing wiring, verifying the adequacy of the existing wiring and breaker, and megger testing the wiring prior to re-terminating and energizing. Any 600V wiring reading less that 5 Megohms shall be reviewed with Airport personnel for acceptance.

B. Where existing circuit breakers are re-used, provide secondary current injection testing to verify the performance of the existing breakers. For switchgear breakers, test to the settings provided by the Engineer.

C. All circuit breakers left unused after demolition and re-installation shall be marked as "Spare" in their respective panel, and all unused wiring removed from the conduit. Contractor is responsible for identifying all related circuits feeding each system being demolished, regardless of whether shown on the Contract drawings.

D. Where new equipment cannot be safely supplied by existing circuits, Contractor shall consult with Engineer for direction.

1.14 CONNECTIONS AND IDENTIFICATION OF CIRCUITS

A. All cables and wiring, underground and otherwise, furnished, installed and tested under this Contract shall be connected at "Source-end" and Load-end," unless otherwise noted, to the satisfaction of the Owner.

B. Included in this Contract shall be all necessary approved terminal and terminating devices required for a complete and working installation, satisfactory to the Owner. Where conductors are to be terminated in equipment furnished by others, the Contractor shall obtain all required termination information from the Contractor furnishing the equipment and complete all terminations.

C. All wires and cables shall be banded with an identifying number at each end and pull boxes. The identifying number of each wire shall be determined at the point of circuit origin, and shall continue unchanged to the point of circuit termination. In general, the circuit numbering system shall conform to the terminal identification numbers of equipment furnished, such as switchboards, motor control centers, relay panels, control console, computer and the like.

PART 2 - PRODUCTS

2.1 CONCRETE/STRUCTURAL

A. General: Provide concrete and associated reinforcing steel for housekeeping pad under new unit substation and other equipment as indicated on drawings.

2.2 JOINT SEALERS

A. General: Joint sealers, joint fillers, and other related materials compatible with each other and with joint substrates under conditions of service and application.

B. Colors: As selected by the Owner from manufacturer's standard colors.

C. Fire-Resistant Joint Sealers: Two-part, foamed-in-place, silicone sealant formulated for use in through-penetration fire-stopping around cables, conduit, pipes, and duct penetrations through fire- rated walls and floors. Sealants and accessories shall have fire- resistance ratings indicated, as established by testing identical assemblies in accordance with ASTM E 814, by Underwriters' Laboratories, Inc., or other testing and inspection agency acceptable to authorities having jurisdiction.

1. Available Products: Subject to compliance with requirements, provide products by one of the following manufacturers or approved equal to meet the specifications:

   a. "Dow Corning Fire Stop Foam," Dow Corning Corp.
   b. "Pensil 851," General Electric Co.

2.3 MATERIALS

A. No materials of any kind shall be used that have not been approved by the Underwriters Laboratories, Inc., where UL provides such service, and each piece of equipment shall have marked thereon, where it can readily be observed, the name or trademark of the manufacturer.

B. Materials and equipment shall be the best of their several kinds and all work shall be performed in a neat, substantial and workmanlike manner, to the satisfaction of the Owner.

2.4 WARNING SIGNS

A. Furnish and install warning signs. They shall conform to the latest OSHA and NEC regulations.

2.5 NAMEPLATES

A. Nameplates shall be provided for all electrical items where identification is required.

B. Nameplates shall be black laminated plastic with white center, fastened with corrosion-resistant screws.

C. Nameplates with 1 inch high lettering shall be provided to identify all distribution and lighting panelboards, controls panels, motor control center and similar equipment.

D. See Section 260553 "Identification for Electrical Systems" for additional requirements.

2.6 RACEWAY AND CABLE TAGS

A. Raceway and cable tags shall be non-ferrous metal or laminated vinyl markers with designation pressure stamped on the tag and attached to the cables or raceways by means of self-locking nylon straps. Letter height shall not be less than 3/16 inch. For additional requirements, refer to Section 260553 "Identification for Electrical Systems."

2.7 PAINTING

A. Provide painting for electrical items as specified in Section 099000 "Painting and coating." Material to be painted shall include the following:

1. High Voltage Conduit- painted red with yellow stenciled circuit information
2. Exposed Conduit in Finished Areas- paint to match finished surfaces
3. Other items and areas as required by drawings and specifications

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting installation and application of joint sealer. Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 GENERAL

A. Equipment/materials installed under this Section shall be fabricated, assembled, erected and placed in proper operating condition in full conformity with the Drawings, Specifications, engineering data, instructions, and recommendations of the equipment manufacturer unless exceptions are noted by the Owner.

B. Submit detailed shop and working drawings for all wiring to all devices/equipment mounted on the actuators and to all associated peripheral devices.

C. Provide adequate time for concrete curing, paint application and other surface preparation.

3.3 ELECTRICAL DEMOLITION

A. Equipment/materials to be demolished include panelboards, wiring and system electrics/local controls associated with demolition of mechanical systems.

B. Provide all required demolition as part of scope. Where major equipment such as panels or disconnect switches that are useable for spare parts or re-application at other locations, consult Airport personnel prior to disposal.

C. Where circuits in embedded conduit are being demolished, conduits are to be capped in a manner that precludes tripping and interference with other installed items.

D. Where circuits are to be taken out of service, the conductors are to be removed in their entirety back to the source panel. Where this is not possible, consult Airport personnel for alternatives.

E. Conduits taken out of service need not be physically removed, unless otherwise noted on contract drawings, provided they are in usable condition and there is no interference with other systems. Conduits left empty shall be labeled as spare and a pull string left inside.

3.4 INSTALLATION OF CONDUITS, FITTINGS, AND BOXES

A. All conduits shall be installed as required. The conduit system shall be installed complete with all accessories, fittings, and boxes, in an approved and workmanlike manner to provide proper raceways for electrical conductors.

B. The Contractor shall note that all conduit runs shown on the Contract Drawings are shown diagrammatically for the purpose of outlining the general method of routing the conduits to avoid interferences.

C. All exposed conduit shall be run parallel to or at right angles to walls or beams, and plumb on the walls.

D. As far as practicable, conduit shall be pitched slightly to drain to the outlet boxes or

otherwise installed to avoid trapping of condensate. Where necessary to secure drainage, a Crouse-Hinds Company type ECD, Universal, Appleton Electric Company ECDB, or equal breather-drain fitting shall be installed in the boxes or trapped conduit at low points. Conduit shall not be run through columns or beams unless so specifically detailed on the Contract Drawings.

E. Conduit system bends and offsets may be made in field using approved bending tools, but no deformed, split or crushed conduit will be permitted in the work. All bends in conduit over 1 inch in diameter shall be made with a pipe bending machine. No more than three quarter bends shall be made between any two pull boxes without permission of the Owner.

F. Conduits shall installed throughout structures in a complete system and must be so run that electrical conductors can be withdrawn and replaced at any time.

G. Where existing conduits are to be reused, they shall be cleaned using approved methods removing all obstructions or imperfection liable to injure the new conductor insulation.

H. Conduit to be built into structure shall be properly protected and suitably supported to prevent strains at joints or injury by building operations, and shall be thoroughly protected at all times from the entrance of water or other foreign matter by being well plugged when work is interrupted. If left dead ended, they shall be furnished with iron caps or pipe plugs.

I. The interior of all conduits conduit fittings, pull and junction boxes shall be carefully and thoroughly cleaned before and after erection.

J. Special care shall be taken to prevent conduits from becoming choked with cement or other debris.

K. No conduit smaller than 3/4 inch shall be used.

3.5 CONDUIT CONNECTIONS TO EQUIPMENT

A. The conduit system shall terminate at the terminal box or at the conduit connection point of electric motors, devices, and equipment. Terminations of conduits at such locations shall permit direct wire connections to the motors, devices, or equipment.

B. Conduit connections shall made with rigid conduit if the equipment is fixed and not subject to adjustment, mechanical movement, or vibration. Rigid conduit connections shall have union fittings, to permit removal of equipment without cutting or breaking the conduit.

C. Conduit connections shall be made with approved flexible metallic conduit if the equipment is subject to adjustment, mechanical movement, or vibration. Flexible conduit connections shall be watertight.

D. Contractor shall be responsible for all final connections of equipment provided, regardless of indication on drawings.

3.6 INSTALLATION - LOW VOLTAGE CABLES

A. All wires and cables pulled into ducts and conduits shall be carefully handled to avoid twists or kinks in the conductors, or damage to the sheaths and insulation. Lubricants will be permitted only where approved by the Owner. Wire and cable manufacturer's recommendations for allowable minimum bending radius and maximum pulling tension shall not be exceeded.

B. All conduits shall be swabbed to remove any debris or accumulated moisture before cables or wires are pulled in.

C. No splices will be permitted between terminals, except at approved junction or terminal box points, as required by code for pull lengths. Cables or wires shall be spliced by crimp type connectors.

D. All hardware, such as cable stanchions, racks, insulators, brackets, structural supports, wall inserts, cable and junction boxes, bolts, connectors, clamps, pulling eyes, fittings, and all other accessories for the installation of wires and cables in buildings, manholes, handholes and out doors shall be furnished and installed complete to provide a satisfactory operating installation.

E. Cable terminations and splices shall be made as recommended by the cable manufacturer for the particular cable and service conditions. Cables shall be terminated by lugs, cup washers, or pressure type connectors.

F. Spare cable ends shall be taped and coiled.

3.7 EQUIPMENT GROUNDING

A. Insulated copper conductors for equipment grounding shall be routed with all power conductors and shall be sized in accordance with the drawings. Where size is not indicated, refer to NEC Table 250-66 or 250-122 as appropriate. These conductors are required for all equipment connected under this Contract; including lighting fixtures, receptacles, and electrical equipment furnished by others, even if not shown on the Contract Drawings.

3.8 PAINTING OF EQUIPMENT

A. After shop fabrication, steel cabinets for switchgear, switches, transformers, distribution panelboards, lighting panelboards and power panelboards shall be thoroughly cleaned and given at least one coat of primer rust inhibitor. Interior finishes shall consist of at least one coat of light gray lacquer or enamel. Exterior finishes shall consist of at least two coats of medium dry gray water-resistant lacquer or enamel.

B. Prior to final completion of the work, the steel work shall be thoroughly cleaned and all scratches and abrasions shall be retouched with the same paint used for the shop finishing coats. Lighting fixtures shall be finished as specified.

3.9 SEALING OF CONDUITS

A. After cable has been installed and connected, conduit ends shall be sealed by non-hardening sealing compound into conduits to a minimum depth equal to the conduit diameter. This shall apply for all conduits at transformers, handholes, manholes, building entrance junction boxes, and for 1 inch and larger conduit connections to equipment.

3.10 ACCEPTANCE TESTS

A. Test all new and (existing) reused power conductors for insulation resistance and circuit breakers for performance as per NETA standards. Submit test report to the Owner.

B. This test shall consist of a complete coordination and functional check under simulated operating conditions, followed by a four-day operational test under actual operating conditions. All tests that are a part of this acceptance test shall be conducted in the presence of not less than two qualified representatives of the Owner, and shall be completed to the satisfaction of the Owner before final payment is made. All costs of equipment, tools, instrument, labor, etc., to make these tests to the satisfaction of the Owner, together with all necessary supervision by the Contractor and manufacturers' service engineers, shall be borne by the Contractor.

C. Any defect in material, equipment, or workmanship furnished under this Contract, together with all inadequacies which may show up during the above tests, shall be promptly made good at the expense of the Contractor, and a new acceptance test shall be scheduled, subject to the same provisions as above described.

D. Engage an independent testing agency to conduct field quality control. Conduct infrared scanning after energizing loads. Provide test reports for review.

3.11 PREPARATION FOR AND APPLICATION OF JOINT SEALERS

A. Surface Cleaning for Joint Sealers: Clean surfaces of joints immediately before applying joint sealers to comply with recommendations of joint sealer manufacturer.

B. Apply joint sealer primer to substrates as recommended by joint sealer manufacturer. Protect adjacent areas from spillage and migration of primers, using masking tape. Remove tape immediately after tooling without disturbing joint seal.

C. Comply with joint sealer manufacturers' printed application instructions applicable to products and applications indicated, except where more stringent requirements apply.

1. Comply with recommendations of ASTM C 962 for use of elastomeric joint sealants.
2. Comply with recommendations of ASTM C 790 for use of acrylic- emulsion joint sealants.

D. Tooling: Immediately after sealant application and prior to time shinning or curing begins, tool sealants to form smooth, uniform beads; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

E. Installation of Fire-Stopping Sealant: Install sealant, including forming, packing, and other accessory materials, to fill openings around electrical services penetrating floors and walls, to provide fire-stops with fire-resistance ratings indicated for floor or wall assembly in which penetration occurs. Comply with installation requirements established by testing and inspecting agency.

3.12 ERECTION OF METAL SUPPORTS AND ANCHORAGE

A. Cut, fit, and place miscellaneous metal fabrications accurately in location, alignment, and elevation to support and anchor electrical materials and equipment.

END OF SECTION 260500

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Project drawings and general provisions of the Contract, including but not limited to all; General and Supplementary Conditions, and other Division 26 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Copper building wire rated 600 V or less.
2. Metal-clad cable, Type MC, rated 600 V or less.
3. Connectors, splices, and terminations rated 600 V and less.

1.3 DEFINITIONS

A. RoHS: Restriction of Hazardous Substances.

B. VFC: Variable-frequency controller.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Product Schedule: Indicate type, use, location, and termination locations.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: Member company of NETA.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

PART 2 - PRODUCTS

2.1 COPPER BUILDING WIRE

A. Description: Flexible, insulated and uninsulated, drawn copper current-carrying conductor with an overall insulation layer or jacket, or both, rated 600 V or less.

B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. General Cable Technologies

2. Okonite Company

3. Southwire Company

4. WESCO.

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. RoHS compliant.
3. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.

E. Conductor Insulation:
1. Type THHN and Type THWN-2: Comply with UL 83.
2. Type THW and Type THW-2: Comply with NEMA WC-70/ICEA S-95-658 and UL 83.

2.2 METAL-CLAD CABLE, TYPE MC

A. Description: A factory assembly of one or more current-carrying insulated conductors in an overall metallic sheath.

B. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. AFC Cable Systems

2. General Cable Technologies

3. Okonite Company

4. Southwire Company

C. Standards:

1. Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.
2. Comply with UL 1569.

3. RoHS compliant.
4. Conductor and Cable Marking: Comply with wire and cable marking according to UL's "Wire and Cable Marking and Application Guide."

D. Circuits:

1. Single circuit.

E. Conductors: Copper, complying with ASTM B 3 for bare annealed copper and with ASTM B 8 for stranded conductors.

F. Ground Conductor: Insulated.

G. Conductor Insulation:

1. Type TFN/THHN/THWN-2: Comply with UL 83.
2. Type XHHW-2: Comply with UL 44.

H. Armor: Steel, interlocked.

I. Jacket: PVC applied over armor.

2.3 CONNECTORS AND SPLICES

A. Description: Factory-fabricated connectors, splices, and lugs of size, ampacity rating, material, type, and class for application and service indicated; listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and use.

1. 3M Electrical Products

2. ILSCO

3. O-Z/Gedney

4. Service Wire Co.

5. Thomas & Betts Corp.

B. Jacketed Cable Connectors: For steel and aluminum jacketed cables, zinc die-cast with set screws, designed to connect conductors specified in this Section.

C. Lugs: One piece, seamless, designed to terminate conductors specified in this Section.

1. Material: Copper.
2. Type: One hole with standard barrels.
3. Termination: Compression.

PART 3 - EXECUTION

3.1 CONDUCTOR MATERIAL APPLICATIONS

A. Feeders & Branch Circuits: Copper; solid for No. 10 AWG and smaller; stranded for No. 8 AWG and larger.

3.2 CONDUCTOR INSULATION AND MULTICONDUCTOR CABLE APPLICATIONS AND WIRING METHODS

A. Exposed Feeders & Branch Circuits: Type THHN/THWN-2, single conductors in raceway.

B. Concealed Feeders & Branch Circuits in Ceilings, Walls, Partitions, and Crawlspaces: Type THHN/THWN-2, single conductors in raceway.

C. Intercepted circuits (i.e. LP-A to LP-B): MC cable or THHN/THWN-2 single conductors in raceway; use of MC cable for this purpose shall require Engineering approval

3.3 INSTALLATION OF CONDUCTORS AND CABLES

A. Complete raceway installation between conductor and cable termination points according to Section 260533 "Raceways and Boxes for Electrical Systems" prior to pulling conductors and cables.

B. Use manufacturer-approved pulling compound or lubricant where necessary; compound used must not deteriorate conductor or insulation. Do not exceed manufacturer's recommended maximum pulling tensions and sidewall pressure values.

C. Use pulling means, including fish tape, cable, rope, and basket-weave wire/cable grips, that will not damage cables or raceway.

D. Install exposed cables parallel and perpendicular to surfaces of exposed structural members, and follow surface contours where possible.

E. Support cables according to Section 260529 "Hangers and Supports for Electrical Systems."

3.4 CONNECTIONS

A. Tighten electrical connectors and terminals according to manufacturer's published torque-tightening values. If manufacturer's torque values are not indicated, use those specified in UL 486A-486B.

B. Make splices, terminations, and taps that are compatible with conductor material and that possess equivalent or better mechanical strength and insulation ratings than unspliced conductors.

C. Wiring at Outlets: Install conductor at each outlet, with at least 6 inches of slack.

3.5 IDENTIFICATION

A. Identify and color-code conductors and cables according to Section 260553 "Identification for Electrical Systems."

B. Identify each spare conductor at each end with identity number and location of other end of conductor, and identify as spare conductor.

3.6 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.7 FIRESTOPPING

A. Apply firestopping to electrical penetrations of fire-rated floor and wall assemblies to restore original fire-resistance rating of assembly according to Section 078413 "Penetration Firestopping."

3.8 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.
   1. After installing conductors and cables and before electrical circuitry has been energized, test conductors feeding the following critical equipment and services for compliance with requirements:

      a. UPS

   2. Perform each of the following visual and electrical tests:

      a. Inspect exposed sections of conductor and cable for physical damage and correct connection according to the single-line diagram.
      b. Test bolted connections for high resistance using one of the following:

1) A low-resistance ohmmeter.
2) Calibrated torque wrench.
3) Thermographic survey.

c. Inspect compression-applied connectors for correct cable match and indentation.
d. Inspect for correct identification.
e. Inspect cable jacket and condition.
f. Insulation-resistance test on each conductor for ground and adjacent conductors. Apply a potential of 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable for a one-minute duration.
g. Continuity test on each conductor and cable.
h. Uniform resistance of parallel conductors.

3. Initial Infrared Scanning: After Substantial Completion, but before Final Acceptance, perform an infrared scan of each splice in conductors No. 3 AWG and larger. Remove box and equipment covers so splices are accessible to portable scanner. Correct deficiencies determined during the scan.

a. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
b. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

D. Cables will be considered defective if they do not pass tests and inspections.

E. Prepare test and inspection reports to record the following:

1. Procedures used.
2. Results that comply with requirements.
3. Results that do not comply with requirements, and corrective action taken to achieve compliance with requirements.

END OF SECTION 260519

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Project drawings and general provisions of the Contract, including but not limited to all; General and Supplementary Conditions, and other Division 26 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes grounding and bonding systems and equipment.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: Certified by NETA.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with UL 467 for grounding and bonding materials and equipment.

2.2 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Burndy; Part of Hubbell Electrical Systems.
2. ERICO; a brand of nVent.
3. ILSCO.
4. O-Z/Gedney; a brand of Emerson Industrial Automation.

5. Thomas & Betts Corporation; A Member of the ABB Group.

2.3 CONDUCTORS

A. Insulated Conductors: Copper wire or cable insulated for 600 V unless otherwise required by applicable Code or authorities having jurisdiction.

B. Bare Copper Conductors:

1. Solid Conductors: ASTM B 3.
2. Stranded Conductors: ASTM B 8.
3. Tinned Conductors: ASTM B 33.
4. Bonding Cable: 28 kcmil, 14 strands of No. 17 AWG conductor, 1/4 inch in diameter.
5. Bonding Conductor: No. 4 or No. 6 AWG, stranded conductor.
6. Bonding Jumper: Copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.
7. Tinned Bonding Jumper: Tinned-copper tape, braided conductors terminated with copper ferrules; 1-5/8 inches wide and 1/16 inch thick.

2.4 CONNECTORS

A. Listed and labeled by an NRTL acceptable to authorities having jurisdiction for applications in which used and for specific types, sizes, and combinations of conductors and other items connected.

B. Welded Connectors: Exothermic-welding kits of types recommended by kit manufacturer for materials being joined and installation conditions.

C. Bus-Bar Connectors: Mechanical type, cast silicon bronze, solderless compression-type wire terminals, and long-barrel, two-bolt connection to ground bus bar.

D. Beam Clamps: Mechanical type, terminal, ground wire access from four directions, with dual, tin-plated or silicon bronze bolts.

E. Cable-to-Cable Connectors: Compression type, copper or copper alloy.

F. Conduit Hubs: Mechanical type, terminal with threaded hub.

G. U-Bolt Clamps: Mechanical type, copper or copper alloy, terminal listed for direct burial.

PART 3 - EXECUTION

3.1 APPLICATIONS

A. Conductors: Install solid conductor for No. 8 AWG and smaller, and stranded conductors for No. 6 AWG and larger unless otherwise indicated.

3.2 EQUIPMENT GROUNDING

A. Install insulated equipment grounding conductors with the following items, in addition to those required by NFPA 70:

1. Feeders and branch circuits.
2. Lighting circuits.
3. Receptacle circuits.
4. Armored and metal-clad cable runs.
5. UPS circuits.

3.3 INSTALLATION

A. Grounding Conductors: Route along shortest and straightest paths possible unless otherwise indicated or required by Code. Avoid obstructing access or placing conductors where they may be subjected to strain, impact, or damage.

B. Bonding Straps and Jumpers: Install in locations accessible for inspection and maintenance except where routed through short lengths of conduit.

1. Bonding to Structure: Bond straps directly to basic structure, taking care not to penetrate any adjacent parts.
2. Bonding to Equipment Mounted on Vibration Isolation Hangers and Supports: Install bonding so vibration is not transmitted to rigidly mounted equipment.
3. Use exothermic-welded connectors for outdoor locations; if a disconnect-type connection is required, use a bolted clamp.

C. Connections: Make connections so possibility of galvanic action or electrolysis is minimized. Select connectors, connection hardware, conductors, and connection methods so metals in direct contact are galvanically compatible.

1. Use electroplated or hot-tin-coated materials to ensure high conductivity and to make contact points closer in order of galvanic series.
2. Make connections with clean, bare metal at points of contact.
3. Coat and seal connections having dissimilar metals with inert material to prevent future penetration of moisture to contact surfaces.

3.4 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. After installing grounding system but before permanent electrical circuits have been energized, test for compliance with requirements.
2. Inspect physical and mechanical condition. Verify tightness of accessible, bolted, electrical connections with a calibrated torque wrench according to manufacturer's written instructions.

D. Grounding system will be considered defective if it does not pass tests and inspections.

E. Prepare test and inspection reports.

F. Report measured ground resistances that exceed the following values:
1. UPS and Panelboards Serving Electronic Equipment: 3 ohm(s).

G. Excessive Ground Resistance: If resistance to ground exceeds specified values, notify Engineer promptly and include recommendations to reduce ground resistance.

END OF SECTION 260526

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Project drawings and general provisions of the Contract, including but not limited to all; General and Supplementary Conditions, and other Division 26 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes secure support from the building structure for electrical items by means of hangers, supports, anchors, sleeves, inserts, seals, and associated fastenings.

1. Refer to other Division 26 sections for additional specific support requirements that may be applicable to specific items.

1.3 SUBMITTALS

A. General: Submit the following in accordance with Conditions of Contract and Specification Sections.

1. Product data for each type of product specified
2. Hanger and support schedule showing manufacturer's figure number, size, spacing, features, and application for each required type of hanger, support, sleeve, seal, and fastener to be used.

B. Shop drawings indicating details of fabricated products and materials.

1.4 QUALITY ASSURANCE

A. Electrical Component Standard: Components and installation shall comply with NFPA 70 "National Electrical Code."

B. Electrical components shall be listed and labeled by UL, ETL, CSA, or other approved, nationally recognized testing and listing agency that provides third-party certification follow-up services.

C. Expansion anchors shall be compliant with requirements of the 2009 International Building Code (IBC).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Available Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers or approved equal to meet the specifications:

1. Slotted Metal Angle and U-Channel Systems:

   a. Allied Tube & Conduit
   b. GS Metals Corp.
   c. Kin-Line, Inc.
   d. Unistrut Diversified Products

2. Conduit Sealing Bushings:

   a. Cooper Industries, Inc.
   b. Killark Electric Mfg. Co.
   c. O-Z/Gedney
   d. Raco, Inc.
   e. Spring City Electrical Mfg. Co.
   f. Thomas & Betts Corp.

2.2 COATINGS FOR ALL SUPPORTING DEVICES

A. Coating for Indoor Locations: Galvanized steel.

2.3 MANUFACTURED SUPPORTING DEVICES

A. Raceway Supports: Clevis hangers, riser clamps, conduit straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring clamps.

B. Fasteners: Types, materials, and construction features as follows:

   1. Expansion Anchors: Stainless steel wedge or sleeve type.
   2. Toggle Bolts: All stainless steel springhead type.

C. Conduit Sealing Bushings: Factory-fabricated watertight conduit sealing bushing assemblies suitable for sealing around conduit, or tubing passing through concrete floors and walls. Construct seals with steel sleeve, malleable iron body, neoprene sealing grommets or rings, metal pressure rings, pressure clamps, and cap screws.

D. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for nonarmored electrical cables in riser conduits. Provide plugs with number and size of conductor gripping holes as required to suit individual risers. Construct body of malleable-iron casting with hot-dip galvanized finish.

2.4 FABRICATED SUPPORTING DEVICES

A. General: Shop- or field-fabricated supports or manufactured supports assembled from U-channel components.

B. Steel Brackets: Fabricated of angles, channels, and other standard structural shapes. Connect with welds and machine bolts to form rigid supports.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install supporting devices to fasten electrical components securely and permanently in accordance with NEC requirements.

B. Coordinate with the building structural system and with other electrical installation.

C. Raceway Supports: Comply with the NEC and the following:

1. Conform to manufacturer's recommendations for selection and installation of supports.
2. Strength of each support shall be adequate to carry present and future load multiplied by a safety factor of at least four. Where this determination results in a safety allowance of less than 200 lbs, provide additional strength until there is a minimum of 200 lbs safety allowance in the strength of each support.
3. Install individual and multiple (trapeze) raceway hangers and riser clamps as necessary to support raceways. Provide U-bolts, clamps, attachments, and other hardware necessary for hanger assembly and for securing hanger rods and conduits.
4. Support parallel runs of horizontal raceways together on trapeze-type hangers.
5. Support individual horizontal raceways by separate pipe hangers. Spring steel fasteners may be used in lieu of hangers only for 1-1/2-inch and smaller raceways serving lighting and receptacle branch circuits above suspended ceilings only. For hanger rods with spring steel fasteners, use 1/4-inch-diameter or larger threaded steel. Use spring steel fasteners that are specifically designed for supporting single conduits or tubing.
6. Space supports for raceways in accordance with Table I of this section. Space supports for raceway types not covered by the above in accordance with NEC.
7. Support exposed and concealed raceway within 1 foot of an unsupported box and access fittings. In horizontal runs, support at the box and access fittings may be omitted where box or access fittings are independently supported and raceway terminals are not made with chase nipples or threadless box connectors.
8. In vertical runs, arrange support so the load produced by the weight of the raceway and the enclosed conductors is carried entirely by the conduit supports with no weight load on raceway terminals.

D. Vertical Conductor Supports: Install simultaneously with installation of conductors.

E. Miscellaneous Supports: Support miscellaneous electrical components as required to produce the same structural safety factors as specified for raceway supports. Install metal channel racks for mounting cabinets, panelboards, disconnects, control enclosures, pull boxes, junction boxes, transformers, and other devices.

F. In open overhead spaces, cast boxes threaded to raceways need not be supported separately except where used for fixture support; support sheet metal boxes directly from the building structure or by bar hangers. Where bar hangers are used, attach the bar to raceways on opposite sides of the box and support the raceway with an approved type of fastener not more than 24 inches from the box.

G. Sleeves: Install in concrete slabs and walls and all other fire- rated floors and walls for raceways. For sleeves through fire rated-wall or floor construction, apply UL- listed firestopping sealant in gaps between sleeves and enclosed conduits and cables in accordance with "Fire Resistant Joint Sealers" requirements.

H. Conduit Seals: Install seals for conduit penetrations of slabs on grade and exterior walls below grade and where indicated. Tighten sleeve seal screws until sealing grommets have expanded to form watertight seal.

I. Fastening: Unless otherwise indicated, fasten electrical items and their supporting hardware securely to the building structure, including but not limited to conduits, raceways, cables, cable trays, busways, cabinets, panelboards, boxes, transformers, disconnect switches, and control components.

3.2 TABLE I: SPACING FOR RACEWAY SUPPORTS

HORIZONTAL RUNS

Raceway Size (Inches)	No. of Conductors in Run	Location	RMC & EMT (1)
3/4	1 or 2	Flat ceiling or wall.	5
3/4	1 or 2	Where it is difficult to provide supports except at intervals fixed by the building construction.	7
¾ - 1	3 or more	Any location.	7
1 & larger	1 or 2	Flat ceiling or wall.	6
1 & larger	1 or 2	Where it is difficult to provide supports except at intervals fixed by the building construction.	10
1 & larger	3 or more	Any location.	10
Any	....	Concealed.	10

VERTICAL RUNS

Raceway Size (Inches)	No. of Conductors in Run	Location	RMC & EMT (1,2)

3/4	....		Exposed.	7
1,1-1/4		....	Exposed.	8
1-1/2 and larger	....		Exposed.	10
Up to 2		....	Shaftway.	14
2-1/2	....		Shaftway.	16
3 & larger	....		Shaftway.	20
Any	....		Concealed.	10

NOTES:

(1) Maximum spacing of supports (feet).
___ (2) Maximum spacings for IMC above apply to straight runs only. Otherwise the maximums for EMT apply.

___ Abbreviations:
___
___ RMC Rigid metallic conduit
___ EMT Electro-Metallic Tubing

END OF SECTION 260529

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Project drawings and general provisions of the Contract, including but not limited to all; General and Supplementary Conditions, and other Division 26 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Metal conduits and fittings.
2. Boxes, enclosures, and cabinets.

1.3 DEFINITIONS

A. ARC: Aluminum rigid conduit.

B. GRC: Galvanized rigid steel conduit.

C. IMC: Intermediate metal conduit.

D. EMT: Electric Metallic Tubing

1.4 ACTION SUBMITTALS

A. Product Data: For surface raceways, wireways and fittings, floor boxes, hinged-cover enclosures, and cabinets.

PART 2 - PRODUCTS

2.1 METAL CONDUITS AND FITTINGS

A. Metal Conduit:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. AFC Cable Systems; a part of Atkore International.
b. Allied Tube & Conduit; a part of Atkore International.
c. FSR Inc.

d. O-Z/Gedney; a brand of Emerson Industrial Automation.

2. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
3. GRC: Comply with ANSI C80.1 and UL 6.
4. ARC: Comply with ANSI C80.5 and UL 6A.
5. IMC: Comply with ANSI C80.6 and UL 1242.

6. EMT: Comply with ANSI C80.3 and UL 797.
7. FMC: Comply with UL 1; zinc-coated steel.
8. LFMC: Flexible steel conduit with PVC jacket and complying with UL 360.

B. Metal Fittings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

a. AFC Cable Systems; a part of Atkore International.
b. Allied Tube & Conduit; a part of Atkore International.
c. Electri-Flex Company.
d. FSR Inc.
e. O-Z/Gedney; a brand of Emerson Industrial Automation.

2. Comply with NEMA FB 1 and UL 514B.
3. Listing and Labeling: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
4. Fittings, General: Listed and labeled for type of conduit, location, and use.
5. Conduit Fittings for Hazardous (Classified) Locations: Comply with UL 1203 and NFPA 70.
6. Fittings for EMT:

a. Material: Steel.
b. Type: Setscrew or compression.
c. Die-cast is Not Acceptable.

7. Expansion Fittings: steel to match conduit type, complying with UL 651, rated for environmental conditions where installed, and including flexible external bonding jumper.

C. Joint Compound for IMC, GRC, or ARC: Approved, as defined in NFPA 70, by authorities having jurisdiction for use in conduit assemblies, and compounded for use to lubricate and protect threaded conduit joints from corrosion and to enhance their conductivity.

2.2 BOXES, ENCLOSURES, AND CABINETS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Crouse-Hinds, an Eaton business.
2. EGS/Appleton Electric.
3. FSR Inc.
4. Hoffman; a brand of nVent.
5. Hubbell Incorporated.
6. O-Z/Gedney; a brand of Emerson Industrial Automation.

B. General Requirements for Boxes, Enclosures, and Cabinets: Boxes, enclosures, and cabinets installed in wet locations shall be listed for use in wet locations.

C. Sheet Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.

D. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.

E. Box extensions used to accommodate new building finishes shall be of same material as recessed box.

F. Device Box Dimensions: 4 inches square by 2-1/8 inches deep.

G. Hinged-Cover Enclosures: Comply with UL 50 and NEMA 250, Type 1 with continuous-hinge cover with flush latch unless otherwise indicated.

1. Metal Enclosures: Steel, finished inside and out with manufacturer's standard enamel.
2. Interior Panels: Steel; all sides finished with manufacturer's standard enamel.

PART 3 - EXECUTION

3.1 RACEWAY APPLICATION

A. Indoors: Apply raceway products as specified below unless otherwise indicated:
1. Exposed, Not Subject to Physical Damage: EMT.
2. Concealed in Ceilings and Interior Walls and Partitions: EMT.
3. Connection to Vibrating Equipment (Including Transformers and Hydraulic, Pneumatic, Electric Solenoid, or Motor-Driven Equipment): FMC, except use LFMC in damp or wet locations.
4. Boxes and Enclosures: NEMA 250, Type 1.

B. Minimum Raceway Size: 3/4-inch trade size.

C. Raceway Fittings: Compatible with raceways and suitable for use and location.

1. Rigid and Intermediate Steel Conduit: Use threaded rigid steel conduit fittings unless otherwise indicated. Comply with NEMA FB 2.10.
2. EMT: Use steel setscrew or compression, steel fittings. Comply with NEMA FB 2.10.
3. Flexible Conduit: Use only fittings listed for use with flexible conduit. Comply with NEMA FB 2.20.

D. Install nonferrous conduit or tubing for circuits operating above 60 Hz. Where aluminum raceways are installed for such circuits and pass through concrete, install in nonmetallic sleeve.

E. Do not install aluminum conduits, boxes, or fittings in contact with concrete or earth.

3.2 INSTALLATION

A. Comply with requirements in Section 260529 "Hangers and Supports for Electrical Systems" for hangers and supports.

B. Comply with NECA 1 and NECA 101 for installation requirements except where requirements on Drawings or in this article are stricter. Comply with NECA 102 for aluminum conduits. Comply with NFPA 70 limitations for types of raceways allowed in specific occupancies and number of floors.

C. Do not install raceways or electrical items on any "explosion-relief" walls or rotating equipment.

D. Do not fasten conduits onto the bottom side of a metal deck roof.

E. Keep raceways at least 6 inches away from parallel runs of flues and steam or hot-water pipes. Install horizontal raceway runs above water and steam piping.

F. Complete raceway installation before starting conductor installation.

G. Arrange stub-ups so curved portions of bends are not visible above finished slab.

H. Install no more than the equivalent of three 90-degree bends in any conduit run except for control wiring conduits, for which fewer bends are allowed. Support within 12 inches of changes in direction.

I. Make bends in raceway using large-radius preformed ells. Field bending shall be according to NFPA 70 minimum radii requirements. Use only equipment specifically designed for material and size involved.

J. Conceal conduit within finished walls, ceilings, and floors unless otherwise indicated (exception UPS room). Install conduits parallel or perpendicular to building lines.

K. Support conduit within 12 inches of enclosures to which attached.

L. Threaded Conduit Joints, Exposed to Wet, Damp, Corrosive, or Outdoor Conditions: Apply listed compound to threads of raceway and fittings before making up joints. Follow compound manufacturer's written instructions.

M. Terminate threaded conduits into threaded hubs or with locknuts on inside and outside of boxes or cabinets. Install bushings on conduits up to 1-1/4-inch trade size and insulated

throat metal bushings on 1-1/2-inch trade size and larger conduits terminated with locknuts. Install insulated throat metal grounding bushings on service conduits.

N. Install raceways square to the enclosure and terminate at enclosures with locknuts. Install locknuts hand tight plus 1/4 turn more.

O. Do not rely on locknuts to penetrate nonconductive coatings on enclosures. Remove coatings in the locknut area prior to assembling conduit to enclosure to assure a continuous ground path.

P. Cut conduit perpendicular to the length. For conduits 2-inch trade size and larger, use roll cutter or a guide to make cut straight and perpendicular to the length.

Q. Install pull wires in empty raceways. Use polypropylene or monofilament plastic line with not less than 200-lb tensile strength. Leave at least 12 inches of slack at each end of pull wire. Cap underground raceways designated as spare above grade alongside raceways in use.

R. Install raceway sealing fittings at accessible locations according to NFPA 70 and fill them with listed sealing compound. For concealed raceways, install each fitting in a flush steel box with a blank cover plate having a finish similar to that of adjacent plates or surfaces. Install raceway sealing fittings according to NFPA 70.

S. Install devices to seal raceway interiors at accessible locations. Locate seals so no fittings or boxes are between the seal and the following changes of environments. Seal the interior of all raceways at the following points:

1. Where conduits pass from warm to cold locations, such as boundaries of refrigerated spaces.
2. Where an underground service raceway enters a building or structure.
3. Conduit extending from interior to exterior of building.
4. Conduit extending into pressurized duct and equipment.
5. Conduit extending into pressurized zones that are automatically controlled to maintain different pressure set points.
6. Where otherwise required by NFPA 70.

T. Comply with manufacturer's written instructions for solvent welding RNC and fittings.

U. Mount boxes at heights indicated on Drawings. If mounting heights of boxes are not individually indicated, give priority to ADA requirements. Install boxes with height measured to top of box unless otherwise indicated.

V. Horizontally separate boxes mounted on opposite sides of walls so they are not in the same vertical channel.

W. Locate boxes so that cover or plate will not span different building finishes.

X. Support boxes of three gangs or more from more than one side by spanning two framing members or mounting on brackets specifically designed for the purpose.

Y. Fasten junction and pull boxes to or support from building structure. Do not support boxes by conduits.

3.3 SLEEVE AND SLEEVE-SEAL INSTALLATION FOR ELECTRICAL PENETRATIONS

A. Install sleeves and sleeve seals at penetrations of exterior floor and wall assemblies. Comply with requirements in Section 260544 "Sleeves and Sleeve Seals for Electrical Raceways and Cabling."

3.4 FIRESTOPPING

A. Install firestopping at penetrations of fire-rated floor and wall assemblies.

END OF SECTION 260533

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Project drawings and general provisions of the Contract, including but not limited to all; General and Supplementary Conditions, and other Division 26 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Sleeves for raceway and cable penetration of non-fire-rated construction walls and floors.
2. Sleeve-seal systems.
3. Sleeve-seal fittings.
4. Grout.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 SLEEVES

A. Wall Sleeves:

1. Steel Pipe Sleeves: ASTM A 53/A 53M, Type E, Grade B, Schedule 40, zinc coated, plain ends.

B. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies: Galvanized-steel sheet; 0.0239-inch minimum thickness; round tube closed with welded longitudinal joint, with tabs for screw-fastening the sleeve to the board.

C. Molded-PE or -PP Sleeves: Removable, tapered-cup shaped, and smooth outer surface with nailing flange for attaching to wooden forms.

D. Sleeves for Rectangular Openings:

1. Material: Galvanized sheet steel.
2. Minimum Metal Thickness:

    a. For sleeve cross-section rectangle perimeter less than 50 inches and with no side larger than 16 inches, thickness shall be 0.052 inch.
    b. For sleeve cross-section rectangle perimeter 50 inches or more and one or more sides larger than 16 inches, thickness shall be 0.138 inch.

2.2 GROUT

A. Description: Nonshrink; recommended for interior and exterior sealing openings in non-fire-rated walls or floors.

B. Standard: ASTM C 1107/C 1107M, Grade B, post-hardening and volume-adjusting, dry, hydraulic-cement grout.

C. Design Mix: 5000-psi, 28-day compressive strength.

D. Packaging: Premixed and factory packaged.

PART 3 - EXECUTION

3.1 SLEEVE INSTALLATION FOR NON-FIRE-RATED ELECTRICAL PENETRATIONS

A. Comply with NECA 1.

B. Sleeves for Conduits Penetrating Above-Grade Non-Fire-Rated Concrete and Masonry-Unit Floors and Walls:

1. Interior Penetrations of Non-Fire-Rated Walls and Floors:

    a. Seal annular space between sleeve and raceway or cable, using joint sealant appropriate for size, depth, and location of joint.
    b. Seal space outside of sleeves with mortar or grout. Pack sealing material solidly between sleeve and wall so no voids remain. Tool exposed surfaces smooth; protect material while curing.

2. Use pipe sleeves unless penetration arrangement requires rectangular sleeved opening.
3. Size pipe sleeves to provide 1/4-inch annular clear space between sleeve and raceway or cable unless sleeve seal is to be installed.

4. Install sleeves for wall penetrations unless core-drilled holes or formed openings are used. Install sleeves during erection of walls. Cut sleeves to length for mounting flush with both surfaces of walls. Deburr after cutting.

C. Sleeves for Conduits Penetrating Non-Fire-Rated Gypsum Board Assemblies:

1. Use circular metal sleeves unless penetration arrangement requires rectangular sleeved opening.
2. Seal space outside of sleeves with approved joint compound for gypsum board assemblies.

D. Aboveground, Exterior-Wall Penetrations: Seal penetrations using steel pipe sleeves and mechanical sleeve seals. Select sleeve size to allow for 1-inch annular clear space between pipe and sleeve for installing mechanical sleeve seals.

END OF SECTION 260544

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Project drawings and general provisions of the Contract, including but not limited to all; General and Supplementary Conditions, and other Division 26 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Color and legend requirements for raceways, conductors, and warning labels and signs.
2. Labels.
3. Cable ties.
4. Signs.
5. Paint for identification.
6. Fasteners for labels and signs.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Comply with NFPA 70.

B. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 COLOR AND LEGEND REQUIREMENTS

A. Color-Coding for Phase- and Voltage-Level Identification, 600 V or Less: Use colors listed below for ungrounded service feeder and branch-circuit conductors.

1. Color shall be factory applied or field applied for sizes larger than No. 8 AWG if authorities having jurisdiction permit.
2. Colors for 208/120-V Circuits:

a. Phase A: Black.
b. Phase B: Red.
c. Phase C: Blue.

3. Color for Neutral: White.
4. Color for Equipment Grounds: Green.

B. Warning Label Colors:

1. Identify system voltage with black letters on an orange background.

C. Clear Working Space:

1. Shall comply with NFPA 70, Article 110.26, and Table 110.26(A)(1). Permanent Floor Marking shall be installed, identifying Clear Working Space.

D. Equipment Identification Labels:

1. Black letters on a white field.

2.3 LABELS

A. Self-Adhesive Labels: Polyester, thermal, transfer-printed, 3-mil-thick, multicolor, weather- and UV-resistant, pressure-sensitive adhesive labels, configured for intended use and location.

a. Brady Corporation.
b. Brother International Corporation.
c. emedco.
d. Ideal Industries, Inc.
e. Panduit Corp.

2.4 CABLE TIES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. HellermannTyton.
2. Ideal Industries, Inc.
3. Marking Services, Inc.
4. Panduit Corp.

B. General-Purpose Cable Ties: Fungus inert, self-extinguishing, one piece, self-locking, and Type 6/6 nylon.

1. Minimum Width: 3/16 inch.
2. Tensile Strength at 73 Deg F according to ASTM D 638: 12,000 psi.

3. Temperature Range: Minus 40 to plus 185 deg F.
4. Color: Black, except where used for color-coding.

2.5 SIGNS

A. Laminated Acrylic or Melamine Plastic Signs:
1. Engraved.
2. Thickness:

a. For signs up to 20 sq. in., minimum 1/16 inch thick.
b. Engraved legend with black letters on white face.
c. Self-adhesive.
d. Framed with mitered acrylic molding and arranged for attachment at applicable equipment.

2.6 MISCELLANEOUS IDENTIFICATION PRODUCTS

A. Paint: Comply with requirements in painting Sections for paint materials and application requirements. Retain paint system applicable for surface material and location (exterior or interior).

B. Fasteners for Labels and Signs: Self-tapping, stainless-steel screws or stainless-steel machine screws with nuts and flat and lock washers.

PART 3 - EXECUTION

3.1 PREPARATION

A. Self-Adhesive Identification Products: Before applying electrical identification products, clean substrates of substances that could impair bond, using materials and methods recommended by manufacturer of identification product.

3.2 INSTALLATION

A. Verify and coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and operation and maintenance manual. Use consistent designations throughout Project.

B. Install identifying devices before installing acoustical ceilings and similar concealment.

C. Verify identity of each item before installing identification products.

D. Coordinate identification with Project Drawings, manufacturer's wiring diagrams, and operation and maintenance manual.

E. Apply identification devices to surfaces that require finish after completing finish work.

F. Install signs with approved legend to facilitate proper identification, operation, and maintenance of electrical systems and connected items.

G. System Identification for Raceways and Cables under 600 V: Identification shall completely encircle cable or conduit. Place identification of two-color markings in contact, side by side.

1. Secure tight to surface of conductor, cable, or raceway.

H. Auxiliary Electrical Systems Conductor Identification: Identify field-installed alarm, control, and signal connections.

I. Elevated Components: Increase sizes of labels, signs, and letters to those appropriate for viewing from the floor.

J. Accessible Fittings for Raceways: Identify the covers of each junction and pull box of the following systems with the wiring system legend and system voltage. System legends shall be as follows:
1. "UPS."

K. Self-Adhesive Labels:

1. On each item, install unique designation label that is consistent with wiring diagrams, schedules, and operation and maintenance manual.
2. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high label; where two lines of text are required, use labels 2 inches high.

L. Floor Marking Tape: Apply stripes to finished surfaces following manufacturer's written instructions.

M. Laminated Acrylic or Melamine Plastic Signs:
1. Unless otherwise indicated, provide a single line of text with 1/2-inch-high letters on 1-1/2-inch-high sign; where two lines of text are required, use labels 2 inches high.

N. Cable Ties: General purpose, for attaching tags, except as listed below:
1. In Spaces Handling Environmental Air: Plenum rated.

3.3 IDENTIFICATION SCHEDULE

A. Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment. Install access doors or panels to provide view of identifying devices.

B. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, pull points, and locations of high visibility. Identify by system and circuit designation.

C. Accessible Raceways and Metal-Clad Cables, 600 V or Less, for Service, Feeder, and Branch Circuits, More Than 30 A and 120 V to Ground: Identify with self-adhesive raceway labels.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

D. Accessible Fittings for Raceways and Cables within Buildings: Identify the covers of each junction and pull box of the following systems with self-adhesive labels containing the wiring system legend and system voltage. System legends shall be as follows:
1. "UPS."

E. Power-Circuit Conductor Identification, 600 V or Less: For conductors in vaults, pull and junction boxes, manholes, and handholes, use self-adhesive vinyl tape to identify the phase.

1. Locate identification at changes in direction, at penetrations of walls and floors, at 50-foot maximum intervals in straight runs, and at 25-foot maximum intervals in congested areas.

F. Control-Circuit Conductor Identification: For conductors and cables in pull and junction boxes, manholes, and handholes, use self-adhesive labels with the conductor or cable designation, origin, and destination.

G. Control-Circuit Conductor Termination Identification: For identification at terminations, provide heat-shrink preprinted tubes with the conductor designation.

H. Auxiliary Electrical Systems Conductor Identification: Self-adhesive vinyl tape that is uniform and consistent with system used by manufacturer for factory-installed connections.

1. Identify conductors, cables, and terminals in enclosures and at junctions, terminals, and pull points. Identify by system and circuit designation.

I. Workspace Indication: Apply floor marking tape to finished surfaces. Show working clearances in the direction of access to live parts. Workspace shall comply with NFPA 70 and 29 CFR 1926.403 unless otherwise indicated. Do not install at flush-mounted panelboards and similar equipment in finished spaces.

J. Equipment Identification Labels:

1. Indoor Equipment: Laminated acrylic or melamine plastic sign.
2. Equipment to Be Labeled:
   a. Enclosed circuit breakers.
   b. Contactors.
   c. Battery-inverter units.
   d. Battery racks.

e. UPS equipment.
f. Panelboards.

END OF SECTION 260553

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Project drawings and general provisions of the Contract, including but not limited to all; General and Supplementary Conditions, and other Division 26 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Service and distribution switchboards rated 600 V and less.
2. Surge protection devices.
3. Disconnecting and overcurrent protective devices.
4. Accessory components and features.
5. Identification.

1.3 ACTION SUBMITTALS

A. Product Data: For each switchboard, overcurrent protective device, surge protection device, ground-fault protector, accessory, and component.

1. Include dimensions and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

B. Shop Drawings: For each switchboard and related equipment.

1. Include dimensioned plans, elevations, sections, and details, including required clearances and service space around equipment. Show tabulations of installed devices, equipment features, and ratings.
2. Detail enclosure types for types other than NEMA 250, Type 1.
3. Detail bus configuration, current, and voltage ratings.
4. Detail short-circuit current rating of switchboards and overcurrent protective devices.
5. Include time-current coordination curves for each type and rating of overcurrent protective device included in switchboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device.
6. Include schematic and wiring diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS

A. Field Quality-Control Reports:

1. Test procedures used.
2. Test results that comply with requirements.
3. Results of failed tests and corrective action taken to achieve test results that comply with requirements.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For switchboards and components to include in emergency, operation, and maintenance manuals.

1. In addition to items specified in Section 017823 "Operation and Maintenance Data," include the following:

a. Routine maintenance requirements for switchboards and all installed components.
b. Manufacturer's written instructions for testing and adjusting overcurrent protective devices.
c. Time-current coordination curves for each type and rating of overcurrent protective device included in switchboards. Submit on translucent log-log graft paper; include selectable ranges for each type of overcurrent protective device.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers qualified as defined in NEMA PB 2.1 and trained in electrical safety as required by NFPA 70E.

B. Testing Agency Qualifications: Accredited by NETA.

1. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Deliver switchboards in sections or lengths that can be moved past obstructions in delivery path.

B. Handle and prepare switchboards for installation according to NECA 400.

1.8 FIELD CONDITIONS

A. Installation Pathway: Remove and replace access fencing, doors, lift-out panels, and structures to provide pathway for moving switchboards into place.

B. Environmental Limitations:

1. Do not deliver or install switchboards until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above switchboards is complete, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
2. Rate equipment for continuous operation under the following conditions unless otherwise indicated:

    a. Ambient Temperature: Not exceeding 104 deg F (40 deg C).
    b. Altitude: Not exceeding 6600 feet (2000 m).

C. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Owner no fewer than five days in advance of proposed interruption of electric service.
2. Indicate method of providing temporary electric service.
3. Do not proceed with interruption of electric service without Owner's written permission.
4. Comply with NFPA 70E.

1.9 COORDINATION

A. Coordinate layout and installation of switchboards and components with other construction that penetrates walls or is supported by them, including electrical and other types of equipment, raceways, piping, encumbrances to workspace clearance requirements, and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Coordinate sizes and locations of concrete bases with actual equipment provided. Cast anchor-bolt inserts into bases. Concrete, reinforcement, and formwork requirements are specified with concrete.

1.10 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace switchboard enclosures, buswork, overcurrent protective devices, accessories, and factory installed interconnection wiring that fail in materials or workmanship within specified warranty period.

B. Manufacturer's Warranty: Manufacturer's agrees to repair or replace surge protection devices that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

2.2 SWITCHBOARDS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Eaton.
2. Siemens Industry, Inc., Energy Management Division.
3. Square D; by Schneider Electric.

B. Source Limitations: Obtain switchboards, overcurrent protective devices, components, and accessories from single source from single manufacturer.

C. Product Selection for Restricted Space: Drawings indicate maximum dimensions for switchboards including clearances between switchboards and adjacent surfaces and other items. Comply with indicated maximum dimensions.

D. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

E. Comply with NEMA PB 2.

F. Comply with NFPA 70.

G. Comply with UL 891.

H. Front-Connected, Front-Accessible Switchboards:

1. Main Devices: Fixed, individually mounted.
2. Branch Devices: Panel mounted.
3. Sections front and rear aligned.

I. Nominal System Voltage: 480Y/277 V.

J. Main-Bus Continuous: 800 A.

K. Indoor Enclosures: Steel, NEMA 250, Type 1.

L. Enclosure Finish for Indoor Units: Factory-applied finish in manufacturer's standard gray finish over a rust-inhibiting primer on treated metal surface.

M. Barriers: Between adjacent switchboard sections.

N. Insulation and isolation for main bus of main section and main and vertical buses of feeder sections.

O. Bus Transition and Incoming Pull Sections: Matched and aligned with basic switchboard.

P. Removable, Hinged Rear Doors and Compartment Covers: Secured by standard bolts, for access to rear interior of switchboard.

Q. Hinged Front Panels: Allow access to circuit breaker, metering, accessory, and blank compartments.

R. Pull Box on Top of Switchboard:

1. Adequate ventilation to maintain temperature in pull box within same limits as switchboard.
2. Set back from front to clear circuit-breaker removal mechanism.
3. Removable covers shall form top, front, and sides. Top covers at rear shall be easily removable for drilling and cutting.
4. Bottom shall be insulating, fire-resistive material with separate holes for cable drops into switchboard.
5. Cable supports shall be arranged to facilitate cabling and adequate to support cables indicated, including those for future installation.

S. Buses and Connections: Three phase, four wire unless otherwise indicated.

1. Provide phase bus arrangement A, B, C from front to back, top to bottom, and left to right when viewed from the front of the switchboard.
2. Phase- and Neutral-Bus Material: Tin-plated, high-strength, electrical-grade aluminum alloy with tin-plated aluminum circuit-breaker line connections.
3. Tin-plated aluminum feeder circuit-breaker line connections.
4. Ground Bus: 1/4-by-2-inch- (6-by-50-mm-) hard-drawn copper of 98 percent conductivity, equipped with mechanical connectors for feeder and branch-circuit ground conductors.
5. Main-Phase Buses and Equipment-Ground Buses: Uniform capacity for entire length of switchboard's main and distribution sections. Provide for future extensions from both ends.
6. Disconnect Links:

    a. Isolate neutral bus from incoming neutral conductors.
    b. Bond neutral bus to equipment-ground bus for switchboards utilized as service equipment or separately derived systems.
7. Neutral Buses: 100 percent of the ampacity of phase buses unless otherwise indicated, equipped with mechanical connectors for outgoing circuit neutral cables. Brace bus extensions for busway feeder neutral bus.
8. Isolation Barrier Access Provisions: Permit checking of bus-bolt tightness.

T. Future Devices: Equip compartments with mounting brackets, supports, bus connections, and appurtenances at full rating of circuit-breaker compartment.

U. Bus-Bar Insulation: Factory-applied, flame-retardant, tape wrapping of individual bus bars or flame-retardant, spray-applied insulation. Minimum insulation temperature rating of 105 deg C.

V. Fungus Proofing: Permanent fungicidal treatment for overcurrent protective devices and other components including instruments and instrument transformers.

2.3 DISCONNECTING AND OVERCURRENT PROTECTIVE DEVICES

A. Molded-Case Circuit Breaker (MCCB): Comply with UL 489, with interrupting capacity to meet available fault currents.
   1. Adjustable Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.
   2. MCCB Features and Accessories:
      a. Standard frame sizes, trip ratings, and number of poles.
      b. Lugs: Mechanical style, suitable for number, size, trip ratings, and conductor material.
      c. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge (HID) lighting circuits.
      d. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 55 percent of rated voltage.
      e. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
      f. Auxiliary Contacts: Two SPDT switches with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.
      g. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.

2.4 ACCESSORY COMPONENTS AND FEATURES

A. Accessory Set: Include tools and miscellaneous items required for overcurrent protective device test, inspection, maintenance, and operation.

B. Portable Test Set: For testing functions of solid-state trip devices without removing from switchboard. Include relay and meter test plugs suitable for testing switchboard meters and switchboard class relays.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Receive, inspect, handle, and store switchboards according to NEMA PB 2.1.

1. Lift or move panelboards with spreader bars and manufacturer-supplied lifting straps following manufacturer's instructions.
2. Use rollers, slings, or other manufacturer-approved methods if lifting straps are not furnished.
3. Protect from moisture, dust, dirt, and debris during storage and installation.
4. Install temporary heating during storage per manufacturer's instructions.

B. Examine switchboards before installation. Reject switchboards that are moisture damaged or physically damaged.

C. Examine elements and surfaces to receive switchboards for compliance with installation tolerances and other conditions affecting performance of the Work or that affect the performance of the equipment.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install switchboards and accessories according to NEMA PB 2.1.

B. Equipment Mounting: Install switchboards on concrete base, 4-inch (100-mm) nominal thickness. Comply with requirements for concrete base specified in Section 033000 "Cast-in-Place Concrete."

1. Install conduits entering underneath the switchboard, entering under the vertical section where the conductors will terminate. Install with couplings flush with the concrete base. Extend 2 inches (50-mm) above concrete base after switchboard is anchored in place.
2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch (450-mm) centers around the full perimeter of concrete base.
3. For supported equipment, install epoxy-coated anchor bolts that extend through concrete base and anchor into structural concrete floor.
4. Place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
5. Install anchor bolts to elevations required for proper attachment to switchboards.
6. Anchor switchboard to building structure at the top of the switchboard if required or recommended by the manufacturer.

C. Temporary Lifting Provisions: Remove temporary lifting eyes, channels, straps and brackets, and temporary blocking of moving parts from switchboard units and components.

D. Operating Instructions: Frame and mount the printed basic operating instructions for switchboards, including control and key interlocking sequences and emergency procedures. Fabricate frame of finished wood or metal and cover instructions with clear acrylic plastic. Mount on front of switchboards.

E. Install filler plates in unused spaces of panel-mounted sections.

F. Install overcurrent protective devices, surge protection devices, and instrumentation.

1. Set field-adjustable switches and circuit-breaker trip ranges.

G. Comply with NECA 1.

3.3 CONNECTIONS

A. Bond conduits entering underneath the switchboard to the equipment ground bus with a bonding conductor sized per NFPA 70.

B. Support and secure conductors within the switchboard according to NFPA 70.

C. Extend insulated equipment grounding cable to busway ground connection and support cable at intervals in vertical run.

3.4 IDENTIFICATION

A. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

B. Switchboard Nameplates: Label each switchboard compartment with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

C. Device Nameplates: Label each disconnecting and overcurrent protective device and each meter and control device mounted in compartment doors with a nameplate complying with requirements for identification specified in Section 260553 "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform tests and inspections.

D. Tests and Inspections:

1. Acceptance Testing:

a. Test insulation resistance for each switchboard bus, component, connecting supply, feeder, and control circuit. Open control and metering circuits within the

switchboard, and remove neutral connection to surge protection and other electronic devices prior to insulation test. Reconnect after test.

b. Test continuity of each circuit.

2. Test ground-fault protection of equipment for service equipment per NFPA 70.
3. Perform each visual and mechanical inspection and electrical test stated in NETA Acceptance Testing Specification. Certify compliance with test parameters.
4. Correct malfunctioning units on-site where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.
5. Perform the following infrared scan tests and inspections, and prepare reports:

   a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each switchboard. Remove front panels so joints and connections are accessible to portable scanner.
   b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switchboard 11 months after date of Substantial Completion.
   c. Instruments and Equipment:

      1) Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

6. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

E. Switchboard will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports, including a certified report that identifies switchboards included and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.

3.6 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

B. Set field-adjustable circuit-breaker trip ranges as indicated.

3.7 PROTECTION

A. Temporary Heating: Apply temporary heat, to maintain temperature according to manufacturer's written instructions, until switchboard is ready to be energized and placed into service.

3.8 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain switchboards, overcurrent protective devices, instrumentation, and accessories, and to use and reprogram microprocessor-based trip, monitoring, and communication units.

END OF SECTION 262413

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

A. Project drawings and general provisions of the Contract, including but not limited to all; General and Supplementary Conditions, and other Division 26 Specification Sections, apply to this Section.

1.2 SUMMARY:

A. Extent of panelboard, load-center and enclosure work, including cabinets and cutout boxes, is indicated by drawings and schedules, and as specified herein.

B. Types of panelboards and enclosures required for the project include the following:

1. Power-distribution panelboards.

C. Refer to other Division 26 sections for wires/cables, electrical boxes and fittings, and raceway work required in conjunction with installation of panelboards and enclosures.

1.3 SUBMITTALS:

A. Product Data: Submit manufacturer's data on panelboards and enclosures. All panels shall be UL listed.

B. Wiring Diagrams: Submit wiring diagrams for panelboards showing connections to electrical power feeders and distribution branches.

1.4 QUALITY ASSURANCE:

A. Installer's Qualifications: A firm with at least 3 years of successful installation experience on projects utilizing panelboards similar to those required for this project.

B. Codes and Standards:

1. Electrical Code Compliance: Comply with applicable local code requirements of the authority having jurisdiction.
2. UL Compliance: Comply with applicable requirements of UL 67, "Electric Panelboards," and UL's 50, 869, 486A, 486B, and 1053 pertaining to panelboards, accessories and enclosures. Provide panelboard units that are UL-listed and labeled.
3. Special-Use Markings: Provide panelboards, constructed for special-use, with appropriate UL markings that indicate that they are suitable for special type of use/application.
4. NEMA Compliance: Comply with NEMA Stds Pub/No. 250, "Enclosures for Electrical Equipment (1000 Volts Maximum)," Pub/No. PB 1, "Panelboards," and Pub/No. PB

1.1,"Instructions for Safe Installation, Operation and Maintenance of Panelboards Rated 600 Volts or Less."

1.5 SEQUENCING AND SCHEDULING:

A. Coordinate installation of panelboards and enclosures with installation of wires/cables, electrical boxes and fittings, and raceway work.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers or approved equal to meet the specifications:

1. Eaton / Cutler- Hammer (Basis of Design)
2. Square D Co.
3. Siemens.

2.2 PANELBOARDS:

A. General: Except as otherwise indicated, provide panelboards, enclosures and ancillary components, of types, sizes, and ratings indicated, which comply with manufacturer's standard materials; with the design and construction in accordance with published product information; equipped with proper number of unit panelboard devices as required for complete installation. Where types, sizes, or ratings are not indicated, comply with NEC, UL and established industry standards for those applications indicated.

B. Overcurrent Protective Devices (OCPDs): Provide type, rating, and features as indicated. Tandem circuit breakers shall not be used. Multipole breakers shall have common trip. All OCPD’s above 250A shall have adjustable trip settings to aid in coordination.

C. Copper Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors. Bonded to box.

D. Provision for Future Devices: Equip with mounting brackets, bus connections, and necessary appurtenances, for the OCPD ampere ratings indicated for future installation of devices.

E. Feed-Through Lugs: Sized to accommodate feeders indicated.

F. Double-Main Lugs: Sized to accommodate feeders indicated.

G. Provide piano hinge door-in-door covers on both the panel and distribution board enclosure fronts and the doors - typical for all panelboards.

H. Provide 25% space for future circuits.

I. Single pole circuit breakers shall not be ganged to form multiple pole breakers.

J. ”Series” rated equipment is not acceptable.

2.3 LIGHTING AND APPLIANCE BRANCH CIRCUIT PANELBOARDS

A. Branch OCPDs: Bolt-on circuit breakers, replaceable without disturbing adjacent units.

B. Lighting and Appliance Panelboards General: Provide dead-front safety type lighting and appliance panelboards as indicated, with switching and protective devices in quantities, ratings, types and arrangements shown; with anti-burn solderless pressure type lug connectors approved for use with copper conductors; construct unit for connecting feeders at top of panel; equip with copper bus bars, full-sized neutral bar, with bolt-in type heavy-duty, quick-make, quick-break, single-pole circuit-breakers, with toggle handles that indicate when tripped. Provide suitable lugs on neutral bus for each outgoing feeder required; and provide bare uninsulated grounding bars suitable for bolting to enclosures. Select enclosures fabricated by same manufacturer as panelboards, which mate and match properly with panelboards.

C. Panelboard Enclosures: Provide galvanized sheet steel cabinet type enclosures, in sizes and NEMA types as indicated, code-gage, minimum 16-gage thickness. Construct with multiple knockouts and wiring gutters. Provide fronts with doors with flush locks and keys, all panelboard enclosures keyed alike, with concealed piano hinges for the door and enclosure front and door swings as indicated. Equip with interior circuit-directory frame, and card with clear plastic covering. Provide baked gray enamel finish over a rust inhibitor coating. Design enclosures for recessed mounting. Provide enclosures which are fabricated by same manufacturer as panelboards, which mate and match properly with panelboards to be enclosed.

1. Enclosure Type: NEMA 1.

D. Double-Width Panels: Where more than 42 poles are indicated or where otherwise indicated, provide two panelboards with a close-coupled nipple conduit, feed-thru lugs on the main panel and conduit and wire to match the incoming on the single line.

E. Doors: In panel front, with concealed hinges. Secure with flush catch and tumbler lock, all keyed alike.

F. Molded-Case Circuit Breakers: Provide factory-assembled, molded-case circuit breakers of frame sizes, characteristics, and ratings including RMS symmetrical interrupting ratings indicated. Select breakers with permanent thermal and instantaneous magnetic trip, and with fault-current limiting protection, ampere ratings as indicated. Construct with overcenter, trip-free, toggle-type operating mechanisms with quick-make, quick-break action and positive handle trip indication. Construct breakers for mounting and operating in any physical position, and operating in an ambient temperature of 40 deg C. Provide breakers

with mechanical screw type removable connector lugs, AL/CU rated.

G. Panelboards shall be made by Eaton / Cutler Hammer or equal. Panelboards shall be rated minimum 65,000 Ampere R.M.S. Symmetrical, for the 277/480 Volt panelboards, and 22,000 Ampere R.M.S. Symmetrical for the 120/208V panelboards.

H. Accessories: Provide panelboard accessories and devices including, but not necessarily limited to, time-delay type fuses, ground-fault protection units, etc., as recommended by panelboard manufacturer for ratings and applications indicated.

PART 3 - EXECUTION

3.1 EXAMINATION:

A. Examine areas and conditions under which panelboards and enclosures are to be installed, and notify Contractor in writing of conditions detrimental to proper completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to Installer.

3.2 INSTALLATION OF PANELBOARDS:

A. Install panelboards and enclosures as indicated, in accordance with manufacturer's written instructions, applicable requirements of NEC standards and NECA's "Standards of Installation," and in compliance with recognized industry practices to ensure that products fulfill requirements.

B. Ground Fault Protection: Install panelboard ground fault circuit interrupter devices in accordance with installation guidelines of NEMA 289, "Application Guide for Ground Fault Circuit Interrupters."

C. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque values for equipment connectors. Where manufacturer's torqueing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Stds 486A.

D. Fasten enclosures firmly to walls and structural surfaces, ensuring that they are permanently and mechanically anchored.

E. Provide properly wired electrical connections for panelboards within enclosures.

F. Fill out panelboard's circuit directory card upon completion of installation work.

G. Provision for Future Circuits at Flush Panelboards: Stub four 1-inch empty conduits from panel into accessible ceiling space.

3.3 GROUNDING:

A. Provide equipment grounding connections for panelboard enclosures as indicated. Tighten connections to comply with tightening torques specified in UL 486A to assure permanent and effective grounds.

3.4 TESTING

A. Prior to energization of electrical circuitry, check all accessible connections to manufacturer's tightening torque specifications.

B. Prior to energization of panelboards, check with ground resistance tester phase-to-phase and phase-to-ground insulation resistance levels to ensure requirements are fulfilled.

C. Prior to energization, check panelboards for electrical continuity of circuits, and for short-circuits.

3.5 ADJUSTING AND CLEANING:

A. Adjust operating mechanisms for free mechanical movement.

B. Touch-up scratched or marred surfaces to match original finishes.

END OF SECTION 262416

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Project drawings and general provisions of the Contract, including but not limited to all; General and Supplementary Conditions, and other Division 26 Specification Sections, apply to this Section.

1.2 SUMMARY

A. This Section includes the following:

1. Receptacles, receptacles with integral GFCI and associated device plates.
2. Snap switches.
3. Wall Plates

1.3 DEFINITIONS

A. EMI: Electromagnetic interference.

B. GFCI: Ground-fault circuit interrupter.

C. Pigtail: Short lead used to connect a device to a branch-circuit conductor.

D. RFI: Radio-frequency interference.

E. TVSS: Transient voltage surge suppressor.

F. UTP: Unshielded twisted pair.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product indicated.

B. Shop Drawings: List of legends and description of materials and process used for pre-marking wall plates.

C. Samples: One for each type of device and wall plate specified, in each color specified.

1.5 INFORMATIONAL SUBMITTALS

A. Field quality-control test reports.

1.6 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For wiring devices to include in all manufacturers' packing label warnings and instruction manuals that include labeling conditions.

1.7 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of wiring device and associated wall plate through one source from a single manufacturer. Insofar as they are available, obtain all wiring devices and associated wall plates from a single manufacturer and one source.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

C. Comply with NFPA 70.

1.8 COORDINATION

A. Receptacles for Owner-Furnished Equipment: Match plug configurations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers' Names: Shortened versions (shown in parentheses) of the following manufacturers' names are used in other Part 2 articles:

1. Cooper Wiring Devices; a division of Cooper Industries, Inc. (Cooper).
2. Hubbell Incorporated; Wiring Device-Kellems (Hubbell).
3. Leviton Mfg. Company Inc. (Leviton).
4. Pass & Seymour/Legrand; Wiring Devices & Accessories (Pass & Seymour).

2.2 STRAIGHT BLADE RECEPTACLES

A. Convenience Receptacles, 125 V, 20 A: Comply with NEMA WD 1, NEMA WD 6 configuration 5-20R, and UL 498.

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

a. Cooper; 5351 (single), 5352 (duplex).
b. Hubbell; HBL5351 (single), CR5352 (duplex).
c. Leviton; 5891 (single), 5352 (duplex).

d. Pass & Seymour; 5381 (single), 5352 (duplex).

2.3 GFCI RECEPTACLES

A. General Description: Straight blade, non-feed-through type. Comply with NEMA WD 1, NEMA WD 6, UL 498, and UL 943, Class A, and include indicator light that is lighted when device is tripped.

B. Duplex GFCI Convenience Receptacles, 125 V, 20 A:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

   a. Cooper; VGF20.
   b. Pass & Seymour; 2095W.

2.4 SNAP SWITCHES

A. Comply with NEMA WD 1 and UL 20.

B. Switches, 120/277 V, 20 A:

1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

   a. Cooper; AH1221 (single pole), AH1222 (two pole), 1223 (three way), 1224 (four way).
   b. Hubbell; CS1221 (single pole), CS1222 (two pole), CS1223 (three way), CS1224 (four way).
   c. Leviton; 1221-2 (single pole), 1222-2 (two pole), 1223-2 (three way), 1224-2 (four way).
   d. Pass & Seymour; PS20AC1 (single pole), PS20AC2 (two pole), PS20AC3 (three way), PS20AC4 (four way).

2.5 WALL PLATES

A. Single and combination types to match corresponding wiring devices.

1. Plate-Securing Screws: Metal with head color to match plate finish.
2. Material for Finished Spaces: Smooth, high-impact thermoplastic
3. Material for Unfinished Spaces: Galvanized steel
4. Material for Damp Locations: Thermoplastic with spring-loaded lift cover, and listed and labeled for use in "wet locations."

B. Wet-Location, Weatherproof Cover Plates: NEMA 250, complying with type 3R weather-resistant thermoplastic with lockable cover.

2.6 FINISHES

A. Color: Wiring device catalog numbers in Section Text do not designate device color.

1. Wiring Devices Connected to Normal Power System: White, unless otherwise indicated or required by NFPA 70 or device listing.

2. Wiring Devices Connected to Emergency Power System: Red, unless otherwise indicated or required by NFPA 70 or device listing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Comply with NECA 1, including the mounting heights listed in that standard, unless otherwise noted.

B. Coordination with Other Trades:

1. Take steps to insure that devices and their boxes are protected. Do not place wall finish materials over device boxes and do not cut holes for boxes with routers that are guided by riding against outside of the boxes.
2. Keep outlet boxes free of plaster, drywall joint compound, mortar, cement, concrete, dust, paint, and other material that may contaminate the raceway system, conductors, and cables.
3. Install device boxes in brick or block walls so that the cover plate does not cross a joint unless the joint is troweled flush with the face of the wall.
4. Install wiring devices after all wall preparation, including painting, is complete.

C. Conductors:

1. Do not strip insulation from conductors until just before they are spliced or terminated on devices.
2. Strip insulation evenly around the conductor using tools designed for the purpose. Avoid scoring or nicking of solid wire or cutting strands from stranded wire.
3. The length of free conductors at outlets for devices shall meet provisions of NFPA 70, Article 300, without pigtails.

4. Existing Conductors:

a. Cut back and pigtail, or replace all damaged conductors.
b. Straighten conductors that remain and remove corrosion and foreign matter.
c. Pig-tailing existing conductors is permitted provided the outlet box is large enough.

D. Device Installation:

1. Replace all devices that have been in temporary use during construction or that show signs that they were installed before building finishing operations were complete.
2. Keep each wiring device in its package or otherwise protected until it is time to connect conductors.
3. Do not remove surface protection, such as plastic film and smudge covers, until the last possible moment.
4. Connect devices to branch circuits using pigtails that are not less than 6 inches in length.
5. When there is a choice, use side wiring with binding-head screw terminals. Wrap solid conductor tightly clockwise, 2/3 to 3/4 of the way around terminal screw.
6. Use a torque screwdriver when a torque is recommended or required by the manufacturer.
7. When conductors larger than No. 12 AWG are installed on 15- or 20-A circuits, splice No. 12 AWG pigtails for device connections.
8. Tighten unused terminal screws on the device.
9. When mounting into metal boxes, remove the fiber or plastic washers used to hold device mounting screws in yokes, allowing metal-to-metal contact.

E. Receptacle Orientation:

1. Install ground pin of vertically mounted receptacles down, and on horizontally mounted receptacles to the right.

F. Device Plates: Do not use oversized or extra-deep plates. Repair wall finishes and remount outlet boxes when standard device plates do not fit flush or do not cover rough wall opening.

G. Arrangement of Devices: Unless otherwise indicated, mount flush, with long dimension vertical and with grounding terminal of receptacles on top. Group adjacent switches under single, multi-gang wall plates.

3.2 FIELD QUALITY CONTROL

A. Perform tests and inspections and prepare test reports.

1. Test Instruments: Use instruments that comply with UL 1436.
2. Test Instrument for Convenience Receptacles: Digital wiring analyzer with digital readout or illuminated LED indicators of measurement.

B. Tests for Convenience Receptacles:

1. Line Voltage: Acceptable range is 105 to 132 V.
2. Percent Voltage Drop under 15-A Load: A value of 6 percent or higher is not acceptable.
3. Ground Impedance: Values of up to 2 ohms are acceptable.
4. GFCI Trip: Test for tripping values specified in UL 1436 and UL 943.
5. Using the test plug, verify that the device and its outlet box are securely mounted.
6. The tests shall be diagnostic, indicating damaged conductors, high resistance at the circuit breaker, poor connections, inadequate fault current path, defective devices, or

similar problems. Correct circuit conditions, remove malfunctioning units and replace with new ones, and retest as specified above.

END OF SECTION 262726

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Project drawings and general provisions of the Contract, including but not limited to all; General and Supplementary Conditions, and other Division 26 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Fusible switches.
2. Nonfusible switches.
3. Receptacle switches.
4. Shunt trip switches.
5. Molded-case circuit breakers (MCCBs).
6. Molded-case switches.
7. Enclosures.

1.3 DEFINITIONS

A. NC: Normally closed.

B. NO: Normally open.

C. SPDT: Single pole, double throw.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of enclosed switch, circuit breaker, accessory, and component indicated. Include nameplate ratings, dimensioned elevations, sections, weights, and manufacturers' technical data on features, performance, electrical characteristics, ratings, accessories, and finishes.

1. Enclosure types and details for types other than NEMA 250, Type 1.
2. Current and voltage ratings.
3. Short-circuit current ratings (interrupting and withstand, as appropriate).
4. Include evidence of a nationally recognized testing laboratory (NRTL) listing for series rating of installed devices.
5. Detail features, characteristics, ratings, and factory settings of individual overcurrent protective devices, accessories, and auxiliary components.

6. Include time-current coordination curves (average melt) for each type and rating of overcurrent protective device; include selectable ranges for each type of overcurrent protective device.

B. Shop Drawings: For enclosed switches and circuit breakers.

1. Include plans, elevations, sections, details, and attachments to other work.
2. Include wiring diagrams for power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For qualified testing agency.

B. Seismic Qualification Certificates: For enclosed switches and circuit breakers, accessories, and components, from manufacturer.

1. Basis for Certification: Indicate whether withstand certification is based on actual test of assembled components or on calculation.
2. Dimensioned Outline Drawings of Equipment Unit: Identify center of gravity and locate and describe mounting and anchorage provisions.
3. Detailed description of equipment anchorage devices on which the certification is based and their installation requirements.

C. Field quality-control reports.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: Accredited by NETA.

1. Testing Agency's Field Supervisor: Currently certified by NETA to supervise on-site testing.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Rate equipment for continuous operation under the following conditions unless otherwise indicated:

1. Ambient Temperature: Not less than minus 22 deg F (minus 30 deg C) and not exceeding 104 deg F (40 deg C).
2. Altitude: Not exceeding 6600 feet (2010 m).

1.8 WARRANTY

A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: One year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Seismic Performance: Enclosed switches and circuit breakers shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. The term "withstand" means "the unit will remain in place without separation of any parts from the device when subjected to the seismic forces specified and the unit will be fully operational after the seismic event."

2.2 GENERAL REQUIREMENTS

A. Source Limitations: Obtain enclosed switches and circuit breakers, overcurrent protective devices, components, and accessories, within same product category, from single manufacturer.

B. Product Selection for Restricted Space: Drawings indicate maximum dimensions for enclosed switches and circuit breakers, including clearances between enclosures, and adjacent surfaces and other items. Comply with indicated maximum dimensions.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by an NRTL, and marked for intended location and application.

D. Comply with NFPA 70.

2.3 NONFUSIBLE SWITCHES

A. Manufacturers

1. Eaton / Cutler Hammer products
2. Square D By Schneider Electric
3. Rockwell Automation by Allen Bradley

B. Type GD, General Duty, Three Pole, Single Throw, 600-V ac, 600 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept two padlocks, and interlocked with cover in closed position.

C. Type HD, Heavy Duty, Three Pole, Single Throw, 600-V ac, 1200 A and Smaller: UL 98 and NEMA KS 1, horsepower rated, lockable handle with capability to accept three padlocks, and interlocked with cover in closed position.

D. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.
3. Isolated Ground Kit: Internally mounted; insulated, labeled for copper and aluminum neutral conductors.
4. Class R Fuse Kit: Provides rejection of other fuse types when Class R fuses are specified.
5. Auxiliary Contact Kit: One NO/NC (Form "C") auxiliary contact(s), arranged to activate before switch blades open.
6. Hookstick Handle: Allows use of a hookstick to operate the handle.
7. Lugs: Compression type, suitable for number, size, and conductor material.
8. Service-Rated Switches: Labeled for use as service equipment.

2.4 RECEPTACLE SWITCHES

A. Manufacturers

1. Eaton / Cutler Hammer products
2. Square D By Schneider Electric
3. Legrand

B. Type HD, Heavy-Duty, Three Pole, Single-Throw Nonfusible Switch: 600-V ac, 20A; UL 98 and NEMA KS 1; horsepower rated, lockable handle with capability to accept three padlocks; interlocked with cover in closed position.

C. Interlocking Linkage: Provided between the receptacle and switch mechanism to prevent inserting or removing plug while switch is in the on position, inserting any plug other than specified, and turning switch on if an incorrect plug is inserted or correct plug has not been fully inserted into the receptacle.

D. Receptacle: Polarized, three-phase, four-wire receptacle (fourth wire connected to enclosure ground lug).

E. Accessories:

1. Equipment Ground Kit: Internally mounted and labeled for copper and aluminum ground conductors.
2. Neutral Kit: Internally mounted; insulated, capable of being grounded and bonded; labeled for copper and aluminum neutral conductors.

3. Isolated Ground Kit: Internally mounted; insulated, labeled for copper and aluminum neutral conductors.
4. Service-Rated Switches: Labeled for use as service equipment.

2.5 MOLDED-CASE CIRCUIT BREAKERS

A. Manufacturers

1. Eaton / Cutler Hammer products
2. SIEMENS
3. Square D By Schneider Electric
4. GE

B. Circuit breakers shall be constructed using glass-reinforced insulating material. Current carrying components shall be completely isolated from the handle and the accessory mounting area.

C. Circuit breakers shall have a toggle operating mechanism with common tripping of all poles, which provides quick-make, quick-break contact action. The circuit-breaker handle shall be over center, be trip free, and reside in a tripped position between on and off to provide local trip indication. Circuit-breaker escutcheon shall be clearly marked on and off in addition to providing international I/O markings. Equip circuit breaker with a push-to-trip button, located on the face of the circuit breaker to mechanically operate the circuit-breaker tripping mechanism for maintenance and testing purposes.

D. The maximum ampere rating and UL, IEC, or other certification standards with applicable voltage systems and corresponding interrupting ratings shall be clearly marked on face of circuit breaker. Circuit breakers shall be **100 percent rated or series rated as indicated on the Drawings**. Circuit breaker/circuit breaker combinations for series connected interrupting ratings shall be listed by UL as recognized component combinations. Any series rated combination used shall be marked on the end-use equipment along with the statement

E. MCCBs shall be equipped with a device for locking in the isolated position.

F. Lugs shall be suitable for 140 deg F (60 deg C) rated wire on 125-A circuit breakers and below 194 deg F (90 deg C) rated wire, sized according to the 167 deg F (75 deg C) temperature rating in NFPA 70.

G. Standards: Comply with UL 489 and NEMA AB 3, with interrupting capacity to comply with available fault currents.

H. Thermal-Magnetic Circuit Breakers: Inverse time-current thermal element for low-level overloads and instantaneous magnetic trip element for short circuits. Adjustable magnetic trip setting for circuit-breaker frame sizes 250 A and larger.

I. Adjustable, Instantaneous-Trip Circuit Breakers: Magnetic trip element with front-mounted, field-adjustable trip setting.

J. Electronic Trip Circuit Breakers: Field-replaceable rating plug, rms sensing, with the following field-adjustable settings:

1. Instantaneous trip.
2. Long- and short-time pickup levels.
3. Long- and short-time time adjustments.
4. Ground-fault pickup level, time delay, and I-squared t response.

K. Current-Limiting Circuit Breakers: Frame sizes 400 A and smaller, and let-through ratings less than NEMA FU 1, RK-5.

L. Integrally Fused Circuit Breakers: Thermal-magnetic trip element with integral limiter-style fuse listed for use with circuit breaker and trip activation on fuse opening or on opening of fuse compartment door.

M. Ground-Fault Circuit-Interrupter (GFCI) Circuit Breakers: Single- and two-pole configurations with Class A ground-fault protection (6-mA trip).

N. Ground-Fault Equipment-Protection (GFEP) Circuit Breakers: With Class B ground-fault protection (30-mA trip).

O. Features and Accessories:

1. Standard frame sizes, trip ratings, and number of poles.
2. Lugs: Compression type, suitable for number, size, trip ratings, and conductor material.
3. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HID for feeding fluorescent and high-intensity discharge lighting circuits.
4. Undervoltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
5. Key Interlock Kit: Externally mounted to prohibit circuit-breaker operation; key shall be removable only when circuit breaker is in off position.

2.6 ENCLOSURES

A. Enclosed Switches and Circuit Breakers: UL 489, NEMA KS 1, NEMA 250, and UL 50, to comply with environmental conditions at installed location.

B. Enclosure Finish: The enclosure shall be finished with gray baked enamel paint, electrodeposited on cleaned, phosphatized steel (NEMA 250 Type 1).

C. Conduit Entry: NEMA 250 Types 4, 4X, and 12 enclosures shall contain no knockouts. NEMA 250 Types 7 and 9 enclosures shall be provided with threaded conduit openings in both endwalls.

D. Operating Mechanism: The circuit-breaker operating handle shall be directly operable through the front cover of the enclosure (NEMA 250 Type 1) and directly operable through the dead front trim of the enclosure (NEMA 250 Type 3R). The cover interlock mechanism shall have an externally operated override. The override shall not permanently disable the interlock mechanism, which shall return to the locked position once the override is released. The tool used to override the cover interlock mechanism shall not be required to enter the enclosure in order to override the interlock.

E. Enclosures designated as NEMA 250 Type 4, 4X stainless steel, 12, or 12K shall have a dual cover interlock mechanism to prevent unintentional opening of the enclosure cover when the circuit breaker is ON and to prevent turning the circuit breaker ON when the enclosure cover is open.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine elements and surfaces to receive enclosed switches and circuit breakers for compliance with installation tolerances and other conditions affecting performance of the Work.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

1. Commencement of work shall indicate Installer's acceptance of the areas and conditions as satisfactory.

3.2 PREPARATION

A. Interruption of Existing Electric Service: Do not interrupt electric service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electric service according to requirements indicated:

1. Notify Owner no fewer than seven days in advance of proposed interruption of electric service.
2. Indicate method of providing temporary electric service.
3. Do not proceed with interruption of electric service without Owner's written permission.
4. Comply with NFPA 70E.

3.3 ENCLOSURE ENVIRONMENTAL RATING APPLICATIONS

A. Enclosed Switches and Circuit Breakers: Provide enclosures at installed locations with the following environmental ratings.

1. Indoor, Dry and Clean Locations: NEMA 250, Type 1

2. Outdoor Locations: NEMA 250, Type 3R
3. Other Wet or Damp, Indoor Locations: NEMA 250, Type 4.
4. Indoor Locations Subject to Dust, Falling Dirt, and Dripping Noncorrosive Liquids: NEMA 250, Type 12.

3.4 INSTALLATION

A. Coordinate layout and installation of switches, circuit breakers, and components with equipment served and adjacent surfaces. Maintain required workspace clearances and required clearances for equipment access doors and panels.

B. Install individual wall-mounted switches and circuit breakers with tops at uniform height unless otherwise indicated.

C. Comply with mounting and anchoring requirements specified in Section 260548.16 "Seismic Controls for Electrical Systems."

D. Temporary Lifting Provisions: Remove temporary lifting of eyes, channels, and brackets and temporary blocking of moving parts from enclosures and components.

E. Install fuses in fusible devices.

F. Comply with NFPA 70 and NECA 1.

3.5 IDENTIFICATION

A. Comply with requirements in Section 260553 "Identification for Electrical Systems."

1. Identify field-installed conductors, interconnecting wiring, and components; provide warning signs.
2. Label each enclosure with engraved metal or laminated-plastic nameplate.

3.6 FIELD QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

C. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

D. Perform tests and inspections with the assistance of a factory-authorized service representative.

E. Tests and Inspections for Switches:

1. Visual and Mechanical Inspection:

a. Inspect physical and mechanical condition.
b. Inspect anchorage, alignment, grounding, and clearances.
c. Verify that the unit is clean.
d. Verify blade alignment, blade penetration, travel stops, and mechanical operation.
e. Verify that fuse sizes and types match the Specifications and Drawings.
f. Verify that each fuse has adequate mechanical support and contact integrity.
g. Inspect bolted electrical connections for high resistance using one of the two following methods:

1) Use a low-resistance ohmmeter.

a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.

2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.

a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.

h. Verify that operation and sequencing of interlocking systems is as described in the Specifications and shown on the Drawings.
i. Verify correct phase barrier installation.
j. Verify lubrication of moving current-carrying parts and moving and sliding surfaces.

2. Electrical Tests:

a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
b. Measure contact resistance across each switchblade fuseholder. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.
c. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with switch closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence of

manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.

d. Measure fuse resistance. Investigate fuse-resistance values that deviate from each other by more than 15 percent.

e. Perform ground fault test according to NETA ATS 7.14 "Ground Fault Protection Systems, Low-Voltage."

F. Tests and Inspections for Molded Case Circuit Breakers:

1. Visual and Mechanical Inspection:

a. Verify that equipment nameplate data are as described in the Specifications and shown on the Drawings.

b. Inspect physical and mechanical condition.

c. Inspect anchorage, alignment, grounding, and clearances.

d. Verify that the unit is clean.

e. Operate the circuit breaker to ensure smooth operation.

f. Inspect bolted electrical connections for high resistance using one of the two following methods:

1) Use a low-resistance ohmmeter.

a) Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from those of similar bolted connections by more than 50 percent of the lowest value.

2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method in accordance with manufacturer's published data or NETA ATS Table 100.12.

a) Bolt-torque levels shall be in accordance with manufacturer's published data. In the absence of manufacturer's published data, use NETA ATS Table 100.12.

g. Inspect operating mechanism, contacts, and chutes in unsealed units.

h. Perform adjustments for final protective device settings in accordance with the coordination study.

2. Electrical Tests:

a. Perform resistance measurements through bolted connections with a low-resistance ohmmeter. Compare bolted connection resistance values to values of similar connections. Investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.

b. Perform insulation-resistance tests for one minute on each pole, phase-to-phase and phase-to-ground with circuit breaker closed, and across each open pole. Apply voltage in accordance with manufacturer's published data. In the absence

of manufacturer's published data, use Table 100.1 from the NETA ATS. Investigate values of insulation resistance less than those published in Table 100.1 or as recommended in manufacturer's published data.

c. Perform a contact/pole resistance test. Drop values shall not exceed the high level of the manufacturer's published data. If manufacturer's published data are not available, investigate values that deviate from adjacent poles or similar switches by more than 50 percent of the lowest value.

d. Perform insulation resistance tests on all control wiring with respect to ground. Applied potential shall be 500-V dc for 300-V rated cable and 1000-V dc for 600-V rated cable. Test duration shall be one minute. For units with solid state components, follow manufacturer's recommendation. Insulation resistance values shall be no less than two megohms.

e. Determine the following by primary current injection:

1) Long-time pickup and delay. Pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.

2) Short-time pickup and delay. Short-time pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.

3) Ground-fault pickup and time delay. Ground-fault pickup values shall be as specified. Trip characteristics shall not exceed manufacturer's published time-current characteristic tolerance band, including adjustment factors.

4) Instantaneous pickup. Instantaneous pickup values shall be as specified and within manufacturer's published tolerances.

f. Test functionality of the trip unit by means of primary current injection. Pickup values and trip characteristics shall be as specified and within manufacturer's published tolerances.

g. Perform minimum pickup voltage tests on shunt trip and close coils in accordance with manufacturer's published data. Minimum pickup voltage of the shunt trip and close coils shall be as indicated by manufacturer.

h. Verify correct operation of auxiliary features such as trip and pickup indicators; zone interlocking; electrical close and trip operation; trip-free, anti-pump function; and trip unit battery condition. Reset all trip logs and indicators. Investigate units that do not function as designed.

i. Verify operation of charging mechanism. Investigate units that do not function as designed.

3. Correct malfunctioning units on-site, where possible, and retest to demonstrate compliance; otherwise, replace with new units and retest.

4. Perform the following infrared scan tests and inspections and prepare reports:

a. Initial Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each enclosed switch and circuit breaker. Remove front panels so joints and connections are accessible to portable scanner.

b. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each enclosed switch and circuit breaker 11 months after date of Substantial Completion.
c. Instruments and Equipment: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.

5. Test and adjust controls, remote monitoring, and safeties. Replace damaged and malfunctioning controls and equipment.

G. Enclosed switches and circuit breakers will be considered defective if they do not pass tests and inspections.

H. Prepare test and inspection reports.

1. Test procedures used.
2. Include identification of each enclosed switch and circuit breaker tested and describe test results.
3. List deficiencies detected, remedial action taken, and observations after remedial action.

3.7 ADJUSTING

A. Adjust moving parts and operable components to function smoothly, and lubricate as recommended by manufacturer.

END OF SECTION 262816

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Project drawings and general provisions of the Contract, including but not limited to all; General and Supplementary Conditions, and other Division 26 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section includes automatic transfer switches rated 600 V and less, including the following:

1. Remote annunciator and control system.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for transfer switches.
2. Include rated capacities, operating characteristics, electrical characteristics, and accessories.

B. Shop Drawings:

1. Include plans, elevations, sections, details showing minimum clearances, conductor entry provisions, gutter space, and installed features and devices.
2. Include material lists for each switch specified.
3. Single-Line Diagram: Show connections between transfer switch, power sources, and load; and show interlocking provisions for each combined transfer switch and bypass/isolation switch.
4. Riser Diagram: Show interconnection wiring between transfer switches, bypass/isolation switches, annunciators, and control panels.

1.4 INFORMATIONAL SUBMITTALS

A. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For each type of product to include in emergency, operation, and maintenance manuals.
1. Features and operating sequences, both automatic and manual.

2. List of all factory settings of relays; provide relay-setting and calibration instructions, including software, where applicable.

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications:

1. Member company of NETA.

a. Testing Agency's Field Supervisor: Certified by NETA to supervise on-site testing.

1.7 FIELD CONDITIONS

A. Interruption of Existing Electrical Service: Do not interrupt electrical service to facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary electrical service:

1. Notify Owner no fewer than five days in advance of proposed interruption of electrical service.
2. Do not proceed with interruption of electrical service without Owner's written permission.

1.8 WARRANTY

A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of transfer switch or transfer switch components that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

B. Comply with NEMA ICS 1.

C. Comply with NFPA 99.

D. Comply with NFPA 110.

E. Comply with UL 1008 unless requirements of these Specifications are stricter.

F. Indicated Current Ratings: Apply as defined in UL 1008 for continuous loading and total system transfer, including tungsten filament lamp loads not exceeding 30 percent of switch ampere rating, unless otherwise indicated.

G. Tested Fault-Current Closing and Short-Circuit Ratings: Adequate for duty imposed by protective devices at installation locations in Project under the fault conditions indicated, based on testing according to UL 1008.

1. Where transfer switch includes internal fault-current protection, rating of switch and trip unit combination shall exceed indicated fault-current value at installation location.
2. Short-time withstand capability for three cycles.

H. Repetitive Accuracy of Solid-State Controls: All settings shall be plus or minus 2 percent or better over an operating temperature range of minus 20 to plus 70 deg C.

I. Resistance to Damage by Voltage Transients: Components shall meet or exceed voltage-surge withstand capability requirements when tested according to IEEE C62.62. Components shall meet or exceed voltage-impulse withstand test of NEMA ICS 1.

J. Electrical Operation: Accomplish by a nonfused, momentarily energized solenoid or electric-motor-operated mechanism. Switches for emergency or standby purposes shall be mechanically and electrically interlocked in both directions to prevent simultaneous connection to both power sources unless closed transition.

K. Neutral Switching: Where four-pole switches are indicated, provide overlapping neutral contacts.

L. Neutral Terminal: Solid and fully rated unless otherwise indicated.

M. Battery Charger: For generator starting batteries.

1. Float type, rated 10 A.
2. Ammeter to display charging current.
3. Fused ac inputs and dc outputs.

N. Annunciation, Control, and Programming Interface Components: Devices at transfer switches for communicating with remote programming devices, annunciators, or annunciator and control panels shall have communication capability matched with remote device.

O. Factory Wiring: Train and bundle factory wiring and label, consistent with Shop Drawings, by color-code or by numbered or lettered wire and cable shrinkable sleeve markers at terminations. Color-coding and wire and cable markers are specified in Section 260553 "Identification for Electrical Systems."

1. Designated Terminals: Pressure type, suitable for types and sizes of field wiring indicated.
2. Power-Terminal Arrangement and Field-Wiring Space: Suitable for top, side, or bottom entrance of feeder conductors as indicated.
3. Control Wiring: Equipped with lugs suitable for connection to terminal strips.
4. Accessible via front access.

P. Enclosures: General-purpose NEMA 250, Type 1, complying with NEMA ICS 6 and UL 508, unless otherwise indicated.

2.2 CONTACTOR-TYPE AUTOMATIC TRANSFER SWITCHES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Cummins Power Generation.
2. Eaton.
3. Kohler Power Systems.
4. MTU Onsite Energy Corporation.

B. Comply with Level 1 equipment according to NFPA 110.

C. Switch Characteristics: Designed for continuous-duty repetitive transfer of full-rated current between active power sources.

1. Limitation: Switches using molded-case switches or circuit breakers or insulated-case circuit-breaker components are unacceptable.
2. Switch Action: Double throw; mechanically held in both directions.
3. Contacts: Silver composition or silver alloy for load-current switching. Contactor-style automatic transfer-switch units, rated 600 A and higher, shall have separate arcing contacts.
4. Conductor Connectors: Suitable for use with conductor material and sizes.
5. Material: Tin-plated aluminum.
6. Main and Neutral Lugs: Mechanical type.
7. Ground Lugs and Bus-Configured Terminators: Mechanical type.
8. Connectors shall be marked for conductor size and type according to UL 1008.

D. Automatic Open-Transition Transfer Switches: Interlocked to prevent the load from being closed on both sources at the same time.

1. Sources shall be mechanically and electrically interlocked to prevent closing both sources on the load at the same time.

E. Automatic Closed-Transition Transfer Switches: Connect both sources to load momentarily. Transition is controlled by programming in the automatic transfer-switch controller.

1. Fully automatic make-before-break operation when transferring between two available power sources.
2. Load transfer without interruption, through momentary interconnection of both power sources not exceeding 100 ms.
3. Initiation of No-Interruption Transfer: Controlled by in-phase monitor and sensors confirming both sources are present and acceptable.

a. Initiation occurs without active control of generator.
b. Automatic transfer-switch controller takes active control of generator to match frequency, phase angle, and voltage.

c. Controls ensure that closed-transition load transfer closure occurs only when the two sources are within plus or minus 5 electrical degrees maximum, and plus or minus 5 percent maximum voltage difference.

4. Failure of power source serving load initiates automatic break-before-make transfer.

F. Manual Switch Operation: Under load, with door closed and with either or both sources energized. Transfer time is same as for electrical operation. Control circuit automatically disconnects from electrical operator during manual operation.

G. Manual Switch Operation: Unloaded. Control circuit automatically disconnects from electrical operator during manual operation.

H. Electric Switch Operation: Electrically actuated by push buttons designated "Normal Source" and "Alternative Source." Switch shall be capable of transferring load in either direction with either or both sources energized.

I. Signal-Before-Transfer Contacts: A set of normally open/normally closed dry contacts operates in advance of retransfer to normal source. Interval shall be adjustable from 1 to 30 seconds.

J. Digital Communication Interface: Matched to capability of remote annunciator or annunciator and control panel.

K. Automatic Transfer-Switch Controller Features:

1. Controller operates through a period of loss of control power.
2. Undervoltage Sensing for Each Phase of Normal Source: Sense low phase-to-ground voltage on each phase. Pickup voltage shall be adjustable from 85 to 100 percent of nominal, and dropout voltage shall be adjustable from 75 to 98 percent of pickup value. Factory set for pickup at 90 percent and dropout at 85 percent.
3. Voltage/Frequency Lockout Relay: Prevent premature transfer to generator. Pickup voltage shall be adjustable from 85 to 100 percent of nominal. Factory set for pickup at 90 percent. Pickup frequency shall be adjustable from 90 to 100 percent of nominal. Factory set for pickup at 95 percent.
4. Time Delay for Retransfer to Normal Source: Adjustable from zero to 30 minutes, and factory set for 10 minutes. Override shall automatically defeat delay on loss of voltage or sustained undervoltage of emergency source, provided normal supply has been restored.
5. Test Switch: Simulate normal-source failure.
6. Switch-Position Pilot Lights: Indicate source to which load is connected.
7. Source-Available Indicating Lights: Supervise sources via transfer-switch normal- and emergency-source sensing circuits.

   a. Normal Power Supervision: Green light with nameplate engraved "Normal Source Available."
   b. Emergency Power Supervision: Red light with nameplate engraved "Emergency Source Available."

8. Unassigned Auxiliary Contacts: Two normally open, single-pole, double-throw contacts for each switch position, rated 10 A at 240-V ac.
9. Transfer Override Switch: Overrides automatic retransfer control so transfer switch will remain connected to emergency power source regardless of condition of normal source. Pilot light indicates override status.
10. Engine Starting Contacts: One isolated and normally closed, and one isolated and normally open; rated 10 A at 32-V dc minimum.
11. Engine Shutdown Contacts: Time delay adjustable from zero to five minutes, and factory set for five minutes. Contacts shall initiate shutdown at remote engine-generator controls after retransfer of load to normal source.
12. Engine-Generator Exerciser: Solid-state, programmable-time switch starts engine generator and transfers load to it from normal source for a preset time, then retransfers and shuts down engine after a preset cool-down period. Initiates exercise cycle at preset intervals adjustable from 7 to 30 days. Running periods shall be adjustable from 10 to 30 minutes. Factory settings shall be for 7-day exercise cycle, 20-minute running period, and 5-minute cool-down period. Exerciser features include the following:

    a. Exerciser Transfer Selector Switch: Permits selection of exercise with and without load transfer.
    b. Push-button programming control with digital display of settings.
    c. Integral battery operation of time switch when normal control power is unavailable.

L. Large-Motor-Load Power Transfer:

1. In-Phase Monitor: Factory-wired, internal relay controls transfer so contacts close only when the two sources are synchronized in phase and frequency. Relay shall compare phase relationship and frequency difference between normal and emergency sources and initiate transfer when both sources are within 15 electrical degrees, and only if transfer can be completed within 60 electrical degrees. Transfer shall be initiated only if both sources are within 2 Hz of nominal frequency and 70 percent or more of nominal voltage.
2. Motor Disconnect and Timing Relay Controls: Designated starters in loss of power scenario shall disconnect motors before transfer and reconnect them selectively at an adjustable time interval after transfer. Control connection to motor starters shall be through wiring external to automatic transfer switch. Provide adjustable time delay between 1 and 60 seconds for reconnecting individual motor loads. Provide relay contacts rated for motor-control circuit inrush and for actual seal currents to be encountered.

2.3 TRANSFER SWITCH ACESSORIES

A. Remote Annunciator and Control System:

1. Source Limitations: Same manufacturer as transfer switch in which installed.
2. Include the following functions for indicated transfer switches:

    a. Indication of sources available, as defined by actual pickup and dropout settings of transfer-switch controls.

b. Indication of switch position.
c. Indication of switch in test mode.
d. Indication of failure of digital communication link.
e. Key-switch or user-code access to control functions of panel.
f. Control of switch-test initiation.
g. Control of switch operation in either direction.
h. Control of time-delay bypass for transfer to normal source.

3. Malfunction of annunciator, annunciation and control panel, or communication link shall not affect functions of automatic transfer switch. In the event of failure of communication link, automatic transfer switch automatically shall revert to standalone, self-contained operation. Automatic transfer-switch sensing, controlling, or operating function shall not depend on remote panel for proper operation.
4. Remote Annunciation and Control Panel: Solid-state components. Include the following features:

a. Controls and indicating lights grouped together for each transfer switch.
b. Label each indicating light control group. Indicate transfer switch it controls, location of switch, and load it serves.
c. Digital Communication Capability: Matched to that of transfer switches supervised.
d. Mounting: Flush, modular, steel cabinet unless otherwise indicated.

2.4 SOURCE QUALITY CONTROL

A. Factory Tests: Test and inspect components, assembled switches, and associated equipment according to UL 1008. Ensure proper operation. Check transfer time and voltage, frequency, and time-delay settings for compliance with specified requirements. Perform dielectric strength test complying with NEMA ICS 1.

B. Prepare test and inspection reports.

1. For each of the tests required by UL 1008, performed on representative devices, for emergency systems. Include results of test for the following conditions:

a. Overvoltage.
b. Undervoltage.
c. Loss of supply voltage.
d. Reduction of supply voltage.
e. Alternative supply voltage or frequency is at minimum acceptable values.
f. Temperature rise.
g. Dielectric voltage-withstand; before and after short-circuit test.
h. Overload.
i. Contact opening.
j. Endurance.
k. Short circuit.
l. Short-time current capability.
m. Receptacle withstand capability.
n. Insulating base and supports damage.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Floor-Mounting Switch: Anchor to floor by bolting.

1. Install transfer switches on cast-in-place concrete equipment base(s). Comply with requirements for equipment bases and foundations specified in Section 033000 "Cast-in-Place Concrete."
2. Comply with requirements for seismic control devices specified in Section 260548.16 "Seismic Controls for Electrical Systems."
3. Coordinate size and location of concrete bases. Cast anchor-bolt inserts into bases.
4. Provide workspace and clearances required by NFPA 70.

B. Annunciator and Control Panel Mounting: Flush in wall unless otherwise indicated.

C. Identify components according to Section 260553 "Identification for Electrical Systems."

D. Set field-adjustable intervals and delays, relays, and engine exerciser clock.

E. Comply with NECA 1.

3.2 CONNECTIONS

A. Wiring to Remote Components: Match type and number of cables and conductors to generator sets, control, and communication requirements of transfer switches as recommended by manufacturer. Increase raceway sizes at no additional cost to Owner if necessary to accommodate required wiring.

B. Wiring Method: Install cables in raceways and cable trays except within electrical enclosures. Conceal raceway and cables except in unfinished spaces.

1. Comply with requirements for raceways and boxes specified in Section 260533 "Raceways and Boxes for Electrical Systems."

C. Wiring within Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's limitations on bending radii.

D. Ground equipment according to Section 260526 "Grounding and Bonding for Electrical Systems."

E. Connect wiring according to Section 260519 "Low-Voltage Electrical Power Conductors and Cables."

F. Connect twisted pair cable according to Section 260523 "Control-Voltage Electrical Power Cables."

G. Route and brace conductors according to manufacturer's written instructions and Section 260529 "Hangers and Supports for Electrical Systems." Do not obscure manufacturer's markings and labels.

H. Final connections to equipment shall be made with liquidtight, flexible metallic conduit no more than 18 inches (457 mm) in length.

3.3 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

C. Perform the following tests and inspections with the assistance of a factory-authorized service representative:

1. After installing equipment, test for compliance with requirements according to NETA ATS.
2. Visual and Mechanical Inspection:

   a. Compare equipment nameplate data with Drawings and Specifications.
   b. Inspect physical and mechanical condition.
   c. Inspect anchorage, alignment, grounding, and required clearances.
   d. Verify that the unit is clean.
   e. Verify appropriate lubrication on moving current-carrying parts and on moving and sliding surfaces.
   f. Verify that manual transfer warnings are attached and visible.
   g. Verify tightness of all control connections.
   h. Inspect bolted electrical connections for high resistance using one of the following methods, or both:

      1) Use of low-resistance ohmmeter.
      2) Verify tightness of accessible bolted electrical connections by calibrated torque-wrench method according to manufacturer's published data.

   i. Perform manual transfer operation.
   j. Verify positive mechanical interlocking between normal and alternate sources.
   k. Perform visual and mechanical inspection of surge arresters.
   l. Inspect control power transformers.

      1) Inspect for physical damage, cracked insulation, broken leads, tightness of connections, defective wiring, and overall general condition.
      2) Verify that primary and secondary fuse or circuit-breaker ratings match Drawings.
      3) Verify correct functioning of drawout disconnecting contacts, grounding contacts, and interlocks.

3. Electrical Tests:

a. Perform insulation-resistance tests on all control wiring with respect to ground.
b. Perform a contact/pole-resistance test. Compare measured values with manufacturer's acceptable values.
c. Verify settings and operation of control devices.
d. Calibrate and set all relays and timers.
e. Verify phase rotation, phasing, and synchronized operation.
f. Perform automatic transfer tests.
g. Verify correct operation and timing of the following functions:

1) Normal source voltage-sensing and frequency-sensing relays.
2) Engine start sequence.
3) Time delay on transfer.
4) Alternative source voltage-sensing and frequency-sensing relays.
5) Automatic transfer operation.
6) Interlocks and limit switch function.
7) Time delay and retransfer on normal power restoration.
8) Engine cool-down and shutdown feature.

4. Measure insulation resistance phase-to-phase and phase-to-ground with insulation-resistance tester. Include external annunciation and control circuits. Use test voltages and procedure recommended by manufacturer. Comply with manufacturer's specified minimum resistance.

a. Check for electrical continuity of circuits and for short circuits.
b. Inspect for physical damage, proper installation and connection, and integrity of barriers, covers, and safety features.
c. Verify that manual transfer warnings are properly placed.
d. Perform manual transfer operation.

5. After energizing circuits, perform each electrical test for transfer switches stated in NETA ATS and demonstrate interlocking sequence and operational function for each switch at least three times.

a. Simulate power failures of normal source to automatic transfer switches and retransfer from emergency source with normal source available.
b. Simulate loss of phase-to-ground voltage for each phase of normal source.
c. Verify time-delay settings.
d. Verify pickup and dropout voltages by data readout or inspection of control settings.
e. Test bypass/isolation unit functional modes and related automatic transfer-switch operations.
f. Perform contact-resistance test across main contacts and correct values exceeding 500 microhms and values for one pole deviating by more than 50 percent from other poles.
g. Verify proper sequence and correct timing of automatic engine starting, transfer time delay, retransfer time delay on restoration of normal power, and engine cool-down and shutdown.

D. Coordinate tests with tests of generator and run them concurrently.

E. Report results of tests and inspections in writing. Record adjustable relay settings and measured insulation and contact resistances and time delays. Attach a label or tag to each tested component indicating satisfactory completion of tests.

F. Transfer switches will be considered defective if they do not pass tests and inspections.

G. Remove and replace malfunctioning units and retest as specified above.

H. Prepare test and inspection reports.

I. Infrared Scanning: After Substantial Completion, but not more than 60 days after Final Acceptance, perform an infrared scan of each switch. Remove all access panels so joints and connections are accessible to portable scanner.

1. Instrument: Use an infrared scanning device designed to measure temperature or to detect significant deviations from normal values. Provide calibration record for device.
2. Record of Infrared Scanning: Prepare a certified report that identifies switches checked and that describes scanning results. Include notation of deficiencies detected, remedial action taken, and observations after remedial action.
3. Follow-up Infrared Scanning: Perform an additional follow-up infrared scan of each switch 11 months after date of Substantial Completion.

3.4 DEMONSTRATION

A. Train Owner's maintenance personnel to adjust, operate, and maintain transfer switches and related equipment.

B. Training shall include testing ground-fault protective devices and instructions to determine when the ground-fault system shall be retested. Include instructions on where ground-fault sensors are located and how to avoid negating the ground-fault protection scheme during testing and circuit modifications.

C. Coordinate this training with that for generator equipment.

END OF SECTION 263600

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Project drawings and general provisions of the Contract, including but not limited to all; General and Supplementary Conditions, and other Division 26 Specification Sections, apply to this Section.

B. See drawings for lighting fixture schedules. Where there is a discrepancy in specifications between this section and the specified light fixture on the drawing, the drawing information shall be followed.

1.2 SUMMARY

A. Extent, location, and details of lighting fixture work are indicated on drawings and in schedules.

B. Types of lighting fixtures in this section include the following:

1. Fluorescent.
2. LED
3. HID

1.3 SUBMITTALS

A. General: Submit the following in accordance with conditions of Contract and Division 1 Specification Sections.

B. Product Data: Submit manufacturer's product data and installation instructions on each type interior and exterior building lighting fixture and component.

C. Shop Drawings: Submit layout drawings of lighting fixtures and their spatial relationship to each other. In addition, submit fixture shop drawings in booklet form with separate sheet for each fixture, assembled in "luminaire type" alphabetical or numerical order, with proposed fixture and accessories clearly indicated on each sheet. Drawings shall indicate complete details of fixture, including manufacturer's catalog numbers for sockets, ballasts, lightshields, lamps, lenses, metal gauges, type of wiring, finish color and texture. Ceiling system shop drawings shall indicate relationship between fixture and adjacent elements of structure (walls, columns, ducts, openings, etc.) Submit details indicating mounting methods.

D. A contractor submitted shop drawing for the lighting fixtures, stamped as Approved by the contractor, constitutes that the contractor has reviewed, coordinated and approved all information (number and quantity of switching devices, ceiling types, wiring schemes, etc.) on the Electrical and Architectural drawings.

1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications: Firms regularly engaged in manufacture of lighting fixtures of sizes, types and ratings required, whose products have been in satisfactory use in similar service for not less than 5 years.

B. Codes and Standards:

1. Electrical Code Compliance: Comply with applicable local code requirements of the authority having jurisdiction and NEC Articles 220, 410, and 510 as applicable to installation, and construction of building lighting fixtures.
2. NEMA Compliance: Comply with applicable requirements of NEMA Stds Pub/No.'s LE 1 and LE 2 pertaining to lighting equipment.
3. IES Compliance.
4. UL Compliance: Comply with UL standards, including UL 486A, pertaining to lighting fixtures. Provide lighting fixtures and components that are UL-listed and labeled.
5. CBM Labels: Provide fluorescent lamp ballasts that comply with Certified Ballast Manufacturers Association standards and carry the CBM label.

1.5 WARRANTY

A. The contractor shall warrant the completed lighting system wiring, equipment, lamps and ballasts to be free from inherent mechanical and electrical defects for a period of one (1) year from the date of Substantial Completion. Refer to Division 1 specifications for definition of Substantial Completion.

B. Contractors shall note that all equipment warranties, as described in the various sections of the Specifications, will begin after Substantial Completion. It will not make any difference when equipment is ordered, delivered or installed, warranties will commence after the letter of "Substantial Completion."

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver lighting fixtures in factory-fabricated containers or wrappings, which properly protect fixtures from damage.

B. Store lighting fixtures in original packaging. Store inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, humidity, laid flat and blocked off ground.

C. Handle lighting fixtures carefully to prevent damage, breaking, and scoring of finishes. Do not install damaged units or components; replace with new.

1.7 SEQUENCING AND SCHEDULING

A. Coordinate with other work including wires/cables, electrical boxes and fittings, and raceways, to properly interface installation of lighting fixtures with other work. Coordinate depth of all lighting fixtures, to eliminate interference with all equipment above the ceiling, with mechanical contractor and general contractor

B. Sequence lighting installation with other work to minimize possibility of damage and soiling

during remainder of construction.

1.8 GENERAL

A. Furnish lighting fixtures, lighting equipment components, branch circuiting and lamps for a complete lighting system.

B. The ballast and all other parts shall be considered as components of the fixture, and it shall be the responsibility of the manufacturer of the fixture to furnish labor and material required to repair or replace any or all of the components that become defective during the guarantee period stated in this specification.

C. Location of fixtures on drawings is diagrammatic. Verify locations with reflected ceiling plans, or other reference data for final location and spacing in advance of installation. Examine space conditions and requirements for installation of fixtures. Coordinate installation of fixtures with other trades to avoid interferences.

D. Wiring channels and socket mountings shall be rigid and accurately made. Sockets shall hold lamps securely against normal vibration and maintenance handling. Socket contacts shall be silver plated. For rapid start lamps on single ballasts, furnish one grounding socket.

E. Provide approved support for each lighting fixture outlet.

F. For pendant-mounted fixtures furnish adjustable ball joint type hangers unless indicated otherwise.

G. Blemished, damaged, or unsatisfactory fixtures shall be replaced at the direction of the Engineer.

H. Reflector cones, aperture plates, and decorative elements of fixtures shall not be installed until completion of plastering, ceiling tile work, painting, and general clean-up in the area.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following or alternatives of the quality necessary to meet the specifications. Manufacturer for each type of fixture are indicated in the fixture schedule.

2.2 FIXTURES

A. General: Provide lighting fixtures, of sizes, types and ratings indicated; complete with, but not limited to, housings, energy- efficient lamps, lamp holders, reflectors, energy efficient ballasts,

starters and wiring. Ship fixtures factory-assembled, with those components required for a complete installation. Design fixtures with concealed hinges and catches, with metal parts grounded as common unit, and so constructed as to dampen ballast generated noise. All High Intensity Discharge fixtures shall be equipped with high impact glass lenses.

B. Fluorescent Lamp Ballasts: Provide 120/277V universal voltage, low-energy, high - frequency electronic fluorescent lamp ballasts, capable of operating lamp types indicated.

1. The electronic ballast shall be provided with integral leads, color coded to ANSI standard C82.11 (latest version).
2. The electronic ballast's input current shall have a "Total Harmonic Distortion" (THD) of less than 10% when used with primary lamp.
3. The electronic ballast shall have a "Power Factor" greater than 98% when used with primary lamp.
4. The electronic ballast shall have a minimum ballast factor of 0.88.
5. The electronic ballast shall have a noise rating (Class A) or better.

C. The following type of the Fluorescent Lamp Ballasts shall be used: Osram/Sylvania or approved equal by Advance Transformer Co. or GE/Magnetek only.

D. LED Fixtures:

1. Exit signage shall be LED illuminated with a minimum life of 20,000 hours. Fixtures shall have field selectable directional arrows, and be suitable for wall or ceiling mounting. Where specified, provide dual face display. Mounting shall be universal for ceiling, wall or flag mounting.
2. Downlights shall utilize royal blue LED array with 4000K color temperature and minimum rated life of 50,000 hours per IESNA.
3. Linear fixtures shall utilize high brightness LEDs with 4000K color temperature and minimum rated life of 50,000 hours per IESNA.

E. Lamps:

1. All lamps within each source type, i.e., fluorescent, incandescent, mercury, quartz, shall be of the same manufacturer.
2. Provide fluorescent lamps of energy saving types as indicated. Use only energy saving fluorescent T8, instant start lamps. For 48" lamps, use only T8 Octron type lamps. Lamps shall be 4100k, minimum 85 CRI with minimum 2820 mean lumens and Extended Performance of 24,000 hours by Phillips or Osram Sylvania.

F. Lighting Fixture Schedule:

1. General: Various fixture types required are indicated on the drawings. Fixtures must comply with minimum requirements as stated herein. Review architectural drawings and specifications to verify ceiling types, modules, suspension systems appropriate to installation. In general, where so noted, substitutions for different type of fixture will be acceptable, based on Engineer's evaluation.
2. A contractor submitted shop drawing for the lighting fixtures, stamped as Approved by

the contractor, constitutes that the contractor has reviewed, coordinated and approved all information (number and quantity of switching devices, ceiling types, wiring schemes, etc.) on the Electrical drawings.

3. Model numbers are shown for information only. The written description for each fixture shall supersede the model number. It shall be the contractor’s responsibility to verify all model numbers and quantities.
4. All final fixture finishes shall be selected by the Engineer prior to fixture approval. Contractor shall assume that the most costly finish will be selected for each fixture type – NO EXEPTIONS.
5. Refer to the contract drawings for the fixture schedule and fixture information.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and conditions under which lighting fixtures are to be installed, and substrate for supporting lighting fixtures. Notify Engineer in writing of conditions detrimental to proper completion of the work. Do not proceed with work until unsatisfactory conditions have been corrected in manner acceptable to Installer.

3.2 INSTALLATION OF LIGHTING FIXTURES

A. Install lighting fixtures at locations and heights as indicated, in accordance with fixture manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation," NEMA standards, and with recognized industry practices to ensure that lighting fixtures fulfill requirements.

B. Provide fixtures and/or fixture outlet boxes with hangers to properly support fixture weight. Submit design of hangers, method of fastening, other than indicated or specified herein, for review by Engineer.

C. Install flush mounted fixtures properly to eliminate light leakage between fixture frame and finished surface.

D. Provide plaster frames for recessed fixtures installed in other than suspended grid type acoustical ceiling systems. Brace frames temporarily to prevent distortion during handling.

E. Fasten fixtures securely to indicated structural supports; and ensure that pendant fixtures are plumb and level. Provide individually mounted pendant fixtures longer than 2 feet with twin stem hangers. Provide stem hanger with ball aligners and provisions for minimum one inch vertical adjustment. Mount continuous rows of fixtures with an additional stem hanger greater than number of fixtures in the row. Chain hung fixtures are not acceptable.

F. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Stds 486A and the National Electrical Code.

G. Support surface mounted fixtures greater than 2 feet in length at a point in addition to the outlet box fixtures stud.

3.3 INSTALLATION OF EXTERIOR LIGHTING FIXTURES

A. Install exterior lighting fixtures at locations and heights as indicated, in accordance with fixture manufacturer's written instructions, applicable requirements of NEC, NECA's "Standard of Installation,” NEMA standards, and with recognized industry practices to ensure that lighting fixtures fulfill requirements.

B. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torquing requirements are not indicated, tighten connectors and terminals to comply with tightening torques specified in UL Stds 486A and B, and the National Electrical Code.

C. Fasten electrical lighting fixtures and brackets securely to indicated structural supports, including poles/standards; and ensure that installed fixtures are plum and level.

D. The Electrical Contractor will furnish and install time clocks, photocell and multi-pole contactors to control the outdoor lighting circuits as shown on drawings.

3.4 TESTING

A. Replace defective and burned out lamps for a period of one year following the Date of Substantial Completion.

B. Furnish stock or replacement lamps amounting to not less than 12 lamps, of each type and size lamp used in each type fixture. Deliver replacement stock as directed to Owner's storage space.

3.5 ADJUSTING AND CLEANING

A. Clean lighting fixtures of dirt and construction debris upon completion of installation. Clean fingerprints and smudges from lenses.

B. Protect installed fixtures from damage during remainder of construction period.

3.6 GROUNDING

A. Provide equipment grounding connections for interior and exterior lighting fixtures as required. Tighten connections to comply with tightening torques specified in UL Std 486A to assure

permanent and effective grounds.

END OF SECTION 265100

SECTION 27 05 00 - COMMON WORK ELEMENTS FOR COMMUNICATIONS

PART 1 - GENERAL

1.1 STIPULATIONS

A. Project drawings and general provisions of the Contract, including but not limited to all; General and Supplementary Conditions, Division 01 Specification Sections and stipulated Specification Sections shall apply to this and all related Division 27 Specification Sections.

B. Related Specification Sections:
1. Division 26 – Common Work Results for Electrical
2. Division 26 – Building Wire and Cable
3. Division 26 – Grounding and Bonding
4. Division 26 – Hangers and Supports
5. Division 26 – Conduit
6. Division 26 – Outlet Boxes
7. Division 26 – Pull & Junction Boxes
8. Division 26 – Underground Ducts & Raceways for Electrical Systems
9. Division 26 – Identification for Electrical Systems
10. 27 05 26 – Telecommunications Grounding and Bonding
11. 27 05 50 – Internet Protocol Television Distribution System (IPTV)
12. 27 10 00 – Structured Cabling System
13. 27 10 10 – Voice Over IP Telephone System
14. 27 10 15 – Wireless Local Area Network System
15. 27 11 00 – Communication Spaces and Equipment Rooms
16. 27 15 16 – Public Address System
17. 27 21 00 – Data Network Communication Equipment
18. 27 42 16 – Multi-User Flight Information Display System (MUFIDS)
19. 28 05 00 – Common Work Elements for ESS
20. 28 13 00 – Physical Access Control System
21. 28 23 00 – Video Surveillance System
22. 28 31 00 – Digital Addressable Fire Alarm System

C. Reference Symbols:
1. All device symbols are defined by the appropriate symbol schedule on the symbols and abbreviations sheet in the telecommunications systems drawing package. Not all device symbols as indicated may be required for the project.
2. Because of the scale of the drawings, symbols are shown on drawings as close as possible to the mounting location. Contractor shall coordinate exact location of all network systems and related components with all related Contract drawings, specifications and affected trades prior to submittal of shop drawings.

D. Abbreviations:
AGC: Automatic Gain Control
ACR Attenuation to Crosstalk Ratio.
ADA Americans with Disabilities Act

AHJ:	Authority Having Jurisdiction
AIDB	Airport Integrated Data Broker
AO	Airport Operations
APC	Automated Passport Control
ASTM	American Society for Testing Materials
ASIS	Formerly the American Society for Industrial Security, now known simply as ASIS International
ATP:	Acceptance Test Plan
AUI	Attachment Unit Interface.
AWS:	Advanced Wireless Service
A/V	Audio Visual Systems – For purposes of this specification section A/V systems shall include all Media Management, Video Broadcasting, Intercommunications (Paging/Public Address, Clock, Auxiliary Sound), Video Intercom, Emergency Communications, Mass Notification, Multi-User Flight Information Displays (MUFIDS), and Internet Protocol Television (IPTV).
BACnet	A communications protocol for building automation and control networks as outlined in ISO 16484-5 and ASHRAE/ANSI Standard 135.
BAS	Building Automation System
BDA:	Bi-Direction Amplifier
BIC	Baggage Input Console Device
BIDS	Baggage Information Display System. See also "MUFIDS."
BICSI	Building Industry Consultant Services International - International organization whose primary objective is to enhance the reputation and skills of companies and individuals employed in the telecommunications and security industries by ensuring that current and developing standards are maintained.
BIDS	Baggage Information Display System
BRS:	Broadband Radio Service
BTS:	Base Transceiver Station
CATV	Community Antenna Television
CBP	Customs and Border Protection
CDMA	Code Division Multiple Access
CEA	Consumer Electronics Association
CFR	Code of Federal Regulations
C/N	Carrier-to-Noise Ratio
CP	Consolidation Point - Local Interconnection Point between horizontal cables from the building IDF/MDF rooms and horizontal cables for the furniture drops.
CPU	Central Processing Unit
CSU	Channel Service Unit
CUPPS	Common Use Passenger Processing
CUSS	Common Use Self Service
CWDM	Coarse Wave Division Multiplexing

dB	Decibel
DAQ	Delivered Audio Quality
DAS	Distributed Antenna System
DDC	Direct Digital Controller / Device Display Controller
DMZ	Demilitarized Zone– A firewall configuration for securing local area networks (LANs).
DP	Demarcation Point - The point of interface between the Communications Networks, IPTV, any Auxiliary Systems, and the associated Service Providers or Public Utilities. Also see "EF." Shall also serve as the primary termination point for all incoming OSP cabling as well as the primary main grounding busbar for all communications systems. Refer to project documents for exact location and termination requirements.
DSS	(Electronic) Dynamic Signage System
DSU	Data Service Unit.
DWDM	Dense Wave Division Multiplexing
EBS	Educational Broadband Service
ECS	Emergency Communications System
EF	Entrance Facility. See also "DP."
ELFEXT	Equal Level Far End Crosstalk.
EME	Experiential Media Environment
EMI	Electromagnetic interference
EMT	Electrical Metallic Tubing – Also known as thin-wall conduit.
ER	Equipment Room – See also "MDF"
ESMR	Enhanced Specialized Mobile Radio
EVAC	UL Listed Emergency Voice Evacuation System. Not to be confused with the building Public Address/Intercom, Intercommunications and/or Mass Notification systems.
FAA	Federal Aviation Administration
FAAP	Remote Fire Alarm Annunciator Panel
FACP	Fire Alarm Control Panel
FAS	Fire Alarm System
FASI	Fire Alarm System Integrator
FCC	Federal Communications Commission
FEXT	Far End Crosstalk
FIDS	Flight Information Display System. See also "MUFIDS."
GFCI	Ground fault circuit interrupter
GIDS	Gate Information Display System. See also "MUFIDS."
GIW	Gate Input Workstation
GUI	Graphical User Interface – A specialized program employing graphical display maps of a facility and/or site which, also provides a manual user interface for all system functions and operations by utilizing control and annunciation icons from dedicated human machine interface terminals.

HMI	Human/Machine Interface – A Computer-operated, video control terminal complying with FCC Part 15 CFR Title 47, Subparts A and B, and shall utilize multiple dynamic GUI based displays for annunciation and control LCD flat panel computer monitor or display screen as defined by related specification sections.
HTML	Hypertext Markup Language
IAMS	Integrated Airport Management System
IATA	International Air Transport Association - The global trade association for the airline industry
IBC	International Building Code
ICT	Information Communications Technology
IDF	Intermediate Distribution Frame – The room/space that shall serve as the local termination point for all horizontal and backbone cabling. Also, shall be known as Equipment Room (ER), Horizontal Cross-Connect (HC) or Floor Distributor (FD).
IEEE	Institute of Electrical and Electronics Engineers
IO	I/O Input/Output
IP	Internet Protocol
IPTV	Internet Protocol Television
IR	Infrared
ISO	International Organization for Standardization
Lab	Computer, Science, and/or Education Laboratory.
LAN	Local Area Network
LCD	Liquid Crystal Display
LED	Light-Emitting Diode
LMR	Land Mobile Radio
LTE	Long Term Evolution (Commonly known as "4G")
LV	Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power- limited circuits.
Mbps	Megabits per second.
MDF	Main Distribution Frame – The room/space that shall serve as the primary termination point for all backbone cabling to each IDF locations and horizontal connection point for local communication drops. May also serve as a local IDF location as well as the cross-connection and interconnection of all entrance cables from the DP for all PSTN and WAN connections. Also shall be known as Main Cross Connect (MC), Telecommunications Room (TR) and/or Campus Distributor (CD)
M-JPEG	Motion – Joint Photographic Experts Group
MPEG	Moving picture experts group.
MTBF	Mean Time Between Failures
MUFIDS	Multi-User Flight Information Display System
NEC	National Electric Code

NEMA	National Electrical Manufacturers Association
NEXT	Near End Crosstalk
NFPA	National Fire Protection Association
NMM	Network Management Module
NMS	Network Management System
NRTL	Nationally Recognized Testing Laboratory
NTSC	National Television System Committee.
NVR	Network Video Recorder
NVW	Network Video Workstation
OAR	Owner’s Authorized Representative
OSP	Outside Plant Cabling
OTDR	Optical Time Domain Reflectometer
PA	Public Address System
PCS	Personal Communications System
POS	Passive Optical Splitter
POTS	Plain Old Telephone Service
PSP	Physical Security Professional as registered by the American Society of Industrial Security-International (ASIS)
PSTN	Public Switched Telephone Network
RCDD	BICSI-accredited Registered Communications Distribution Designer
PSN	Public Safety Network
RFI	Radio-frequency interference / Request for Information
RGS	Rigid Galvanized Steel conduit: Galvanized steel tubing, with a tubing wall that is thick enough to allow it to be threaded.
RoF	Radio-over-Fiber
RoHS:	Restriction of Hazardous Substances
RSL	Received Signal Level
RSSI	Received Signal Strength Indication
RSRP	Reference Signal Receive Power
RS-232	An ANSI/TIA standard for asynchronous serial data communications protocol between terminal devices. This standard defines a 25-pin connector and certain signal characteristics for interfacing computer equipment.
RS-485	An ANSI/TIA multipoint communications protocol standard.
SCADA	Supervisory Control and Data Acquisition
SISO	Single-Input, Single-Output
SLA	Service Level Agreement
SMR	Specialized Mobile Radio
SMS	Security Management System / Short Message Service
SNIR	Signal-to-Noise Interference Ratio
SNMP	Simple Network Management Protocol
SOW	Statement of Work
STC	South Terminal Complex
TCP/IP	A standard protocol stack on which the Internet and data communications networks operate
TGB	Telecommunications Grounding Busbar – Located in each

IDF	Intermediate Distribution Frame – See also "TR"
TIA	Telecommunications Industry Association
TMGB	Telecommunications Main Grounding Busbar
TP	Transition Point – A location in the horizontal cabling where flat under carpet cable transitions to a horizontal cabling consolidation point (CP).
TR	Telecommunications Room -- See also "IDF"
TSA	Transportation Security Administration
TSB	Technical Service Bulletin
TVSS	Transient Voltage Surge Suppressor
UHD	Ultra High Definition
UPS	Uninterruptible Power Supply
UTP	Unshielded Twisted Pair
VDGS	Visual Docking Guidance System
VLAN	Virtual Local Area Network
VoIP	Voice Over IP telephone Network
VPN	Virtual Private Network– A technique made possible by switching technologies that permits the logical grouping of any number of network devices into one or more sub-networks.
VSS	Video Surveillance System
VSWR	Voltage Standing Wave Ratio
WAN	Wide Area Network
WAP	Wireless Access Point
WLAN	Wireless Local Area Network
WSP	Wireless Service Provider
10BASE2	10 Mbps data throughput over coaxial cable.
10BASE-T	10 Mbps data throughput over twisted pair cable.
10BAE-FL	10 Mbps data throughput over fiber.
100BASE-T	100 Mbps data throughput over twisted pair cable.
100BASE-TX	100 Mbps data throughput over Category 5 twisted pair or greater.
100BASE-FL	100 Mbps data throughput over fiber.
1K-BASE-T	1Gbps data throughput over Category 5 twisted pair or greater.
1K-BASE-LX/LH	1Gbps data throughput over 9-micron single mode fiber.
1K-BASE-ZX:	1Gbps data throughput over 8-micron single mode fiber.
10GBASE-T	10Gbps data throughput over Category 6A/6e twisted pair or greater.

E. Definitions:
   1. Contract Documents: The documents consisting of the Form of Agreement between Authority and Contractor, Conditions of the Contract, (General, Supplementary, and other Conditions), Drawings, Specifications and all Addenda issued prior to the execution of the Contract.
   2. Contract Drawings: The drawings that form a part of the Contract Documents that provides the graphical representation of the project requirements intended design and/or performance criteria to be delivered by the Contractor.
   3. Reference Drawings: A drawing and/or set of drawings produced by a proprietary supplier, manufacturer, subcontractor, or fabricator included in the Contract Documents for informational purposes, providing specific information related to the installation of related appurtenances, components, devices, hardware, products, and/or systems. Reference Drawings shall also include any Contract Drawings from prior bid packages that may have pertinent information or require coordination of trades related to this contract.
   4. Shop Drawings: A drawing and/or set of drawings produced by the contractor, supplier, manufacturer, subcontractor, or fabricator as a detailed representation of the proper installation of the related, appurtenance, component, device, hardware, product, and/or system to be delivered in conformance to the requirements of the Contract Documents.
   5. The Authority: Destin For Walton Beach Airport (VPS), Florida (Owner)
   6. Furnish: Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
   7. Install: Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
   8. Provide: Furnish and install, complete and ready for the intended use.

1.2 SUMMARY

A. This Section contains the overall requirements associated with all Division 27 and related Division 28 Specification Sections, and includes the project design intent for all network communication cabling and equipment related to the installation of the following systems:
   1. Structured Cabling System
   2. VoIP Telephone System
   3. Wireless Local Area Network (WLAN)
   4. Multi-User Flight Information Display System (MUFIDS)
   5. Internet Protocol Television Distribution System (IPTV)
   6. Public Announcement System (PA)
   7. Access Control System (ACS)
   8. Video Surveillance System (VSS)

B. In addition, this section shall address all requirements for submittals, quality assurance, product handling, record documents, project conditions, installation, system performance, demonstrations, testing, and certifications for all scopes of work related to network communication cabling for this project scope of work. Refer to related Division 26, 27 and 28 specification sections and all contract drawings for additional requirements.

1. The Contractor shall manage and coordinate all technology, multimedia, control, garage and security system aspects of the project. This includes, but are not limited to, systems that are connected with Active Ethernet Network, or other types of communication and control equipment.
   a. The Contractor shall coordinate with the other Contractors to ensure all infrastructure and systems between buildings, including any connections to the existing Authority systems are completely coordinated and operational.
   b. The Contractor shall have overall responsibility for all design implementation, equipment and all technical support related to all technology scopes of work and shall ensure full coordination of all work as required to provide fully operational communications infrastructures and systems in accordance with all requirements of the Contract Documents and applicable Codes and Standards.
   c. The Contractor shall ensure the work including planning, installation, and commissioning of technology and multimedia systems are closely coordinated with the Authority.
   d. The Contractor shall be responsible for, at a minimum, the following tasks and activities:
      1) Project Management
      2) Schedule Management
      3) IT System Impact Analysis
      4) Staff Training/Development
      5) Performance Management
      6) Change Management
      7) Project Closeout
      8) Estimating
      9) Scheduling
      10) Weekly Status Meetings including look-ahead
      11) Cost Controls
      12) Status Reporting
      13) Contract Administration
      14) Document Review
      15) Contractor Change Order Review
      16) Trend & Variance Reporting
      17) Document Controls
      18) "As Built" Schedule Updates

2. All sub-contractors shall meet the minimum technical capabilities, certifications, and licensing requirements as defined by the "Quality Assurance" chapter as specified herein as well as all related specification sections.

C. It shall be the responsibility of the Contractor to furnish and install all necessary cabling, conduits/raceways, cable terminations, controls, systems, materials, devices, components, electrical power, equipment racks/cabinets and software as well as all appurtenances, programming, commissioning and testing necessary to deliver a complete and fully operational communications network infrastructures and systems as indicated by the contract documents.

D. The installation, performance, features, functions, software, licenses, and programming criteria as specified herein as well as all related drawings and Division 27 specification sections have been designed to offer the maximum system efficiency, ease of operation, occupant safety and the protection of equipment..

1. Any deviations from the specified criteria shall be documented, reviewed, and agreed to in writing by the Authority prior to submission of bids. Refer to Division 01, and all related Division 27 Specification Sections for any substitutions and/or project deviation requests.
   a. The required information shall include but not be limited to: reason for deviation, all differences in performance, operation, and function from the herein specified requirements, all benefits, and added features to the Authority as a result of the deviations and any additional incurred costs to the Authority for maintenance and long-term ownership.
   b. Failure to provide the Authority with the required information shall result in any shop drawing submissions being returned for non- conformance with the contract requirements.
2. The contractor and all sub-contractors for this work shall read and accept all of the General Conditions, Special Requirements, General Requirements, and all related specification sections and in the execution of all work shall be bound by all of the conditions and requirements therein.
   a. Prior to the submission of the Bid any discrepancies or inconsistencies noted within these specifications and/or the project drawings shall be brought to the immediate attention of the Authority.
   b. Where ambiguity exists between the project specifications and the contract drawings, the superior in system performance shall prevail, and shall be delivered by the Contractor at no additional expense to the project.

E. All device symbols are defined by the appropriate symbol schedules as indicated by the symbol and abbreviation drawing sheets for each discipline. The Contractor shall coordinate exact locations with all architectural, mechanical, electrical, reflected ceiling, furniture drawings and door hardware specifications as well as all affected trades prior to submittal of bids.

1. All symbols are shown on the contract drawings as close as possible to their intended location. Contractor shall coordinate the installation of all equipment, devices, controls, components, cabling conduits/raceways and integration of other systems with all affected trades and specified system sub-contractors. The contractor shall document all coordination requirements at the time of shop drawing submission.

2. Drawings for this work are diagrammatic and intended to convey the extent, general arrangement, and locations of the work. Because of the scale of the drawings, certain basic items such as access panels, conduits, cabinet sizes, penetration sleeves, pull boxes, back-boxes and junction boxes may or may not be shown on the contract drawings. Include all items where required by code and related specification sections for proper installation of all work.

F. Project specifications and drawings may not deal individually with every part, control, device, component, or appurtenance which may be required to produce the equipment performance for the specified system and/or as required for compliance with all specified systems integration.
   1. Include such items and components, as required, for complete operational systems as defined by the project documents, whether specifically indicated or not. The contractor shall be responsible for providing conduits/raceways, cable terminations, controls, systems, equipment, materials, devices, components, electrical power, equipment racks/cabinets, software, programming, commissioning, testing and all appurtenances as well as the integration of any ancillary systems or Authority provided equipment/components/systems.
   2. Coordinate with other applicable trades in submittal of shop drawings and the installation of all systems. All shop drawings shall detail space conditions in order to accommodate other concerned trades, all equipment locations are subject to final review by the Authority.

G. All Division 27 scopes of work shall include the necessary labor, software, equipment, materials, devices, cabling, conduits and electrical power as well as the performance of all system programming, testing and commissioning as required to provide fully operational systems in accordance with all requirements of the project documents.
   1. Coordinate the installation of all systems, equipment, components, materials, conduits, cabling, devices and all existing system modifications with the Authority prior to the submission of any shop drawings.
   2. All Division 27 systems work shall include the labeling of all wire terminations and enclosure locations in accordance with the Division 27 Specifications. All wiring shall terminate on fixed terminal strips, punch blocks, or patch panels in accordance with all requirements of the project drawings and related specifications.
      a. No splices shall be permitted in underground maintenance holes and non-accessible junction boxes. All junction boxes containing any system splices shall be uniquely identified.
      b. All mounting heights and accessibility to all equipment requiring access by individuals with disabilities shall comply with ANSI A117.1 requirement.
      c. All equipment enclosures located outside or in all areas with high moisture or high humidity shall be NEMA 4X enclosures and rated for that application.

d. All devices, components, or equipment installed on the exterior of the facility shall be provided in accordance with all manufacturers' requirements to ensure the proper operation when exposed to the environmental conditions and/or average annual lowest temperature that can be anticipated for the geographic region of the facility.

e. All interior devices exposed to the general population shall be installed in secured equipment enclosures and installed in such a manner that resists tampering and/or removal without the use of specialized tools.

3. All work shall be neat in appearance, free of rough edges, scratches, blemishes, cracks and exposed gaps. All equipment shall be secured to the mounting surface, and fastened with hardware approved by the manufacturer and capable of supporting the rated load. All backbone/permanent cables within enclosures shall be neatly routed and tie wrapped at 6 inches on center. Patch cables shall be secured with hook-and-loop (Velcro) or wire management guides. All wire splices shall be terminated on terminal strips and/or soldered in place. Any splices utilizing wire nuts shall not be acceptable.

H. Use of Premises

1. The Contractors shall have limited use of premises for construction operations only as required to meet the scope of work as delineated by the Contract Documents.

2. The Contractor shall design, prepare, schedule, and coordinate all scopes of work without disruption of any existing system functions or the daily operation of the existing facility. All cabling and equipment shall be installed in such a manner that all new controls, equipment and/or devices shall be installed, programmed and tested prior to modification, switch over and/or disconnecting of any existing systems.

a. Include all costs related to any phased construction methodologies having to do with the scope of work defined herein, including, but not limited to, all necessary temporary equipment, devices, components or systems as well as any labor costs associated with any installation, commissioning, testing demolition of any technology systems required to be performed after normal business hours of the facility.

b. Prior to the disabling, modifications, switchover and/or demolition of any existing system components and/or cabling, all new system components, equipment, conduits, cabling, shall be in place, tested and fully operational.

c. The contractor shall coordinate all installation activities so as not to disrupt the daily operations of the airport and shall include any costs related to a phased construction methodology where applicable. Installation activity and costs shall include but are not limited all necessary temporary equipment, devices, components or systems as well as any labor costs associated with any installation, commissioning, testing demolition of any systems required to be performed after normal business hours of the facility.

d. Contractor shall coordinate all utility outages in writing with the Authority in advance.

3. Contractor shall plan, schedule and install all scopes of work in accordance with all requirements of the project construction schedule. Refer to related specification sections for additional information related to project scheduling and facility access.
   a. The contractor shall coordinate all installation and demolition activities so as not to disrupt the daily routine of the existing facility or negatively impact the integrity of the facility's security and life safety measures.

I. Coordination
1. The Contractor shall coordinate with all other affected trades in the submittal of shop drawings and the installation of all equipment, devices, and systems. All shop drawings shall detail space conditions in order to accommodate other concerned trades, all equipment and device locations are subject to final review by the Authority.
   a. If installation of equipment, raceways, cable trays, and/or conduit is performed prior to coordination with all other trades, which interferes with work of other trades or the performance of the system, the contractor shall make necessary changes to correct the condition at no additional cost to the Authority.
   b. The structured cabling system shall provide for the support and connectivity of the Building Automation System (BAS). The Contractor shall coordinate with the work specified in Division 23 and Division 28 as required for the connectivity and proper integration of the BAS, all life safety and security system requirements in accordance with the Contract Documents.
   c. Provide all cabling, conduits, terminations, and programming to properly interface the BAS, fire alarm and access control systems with all related mechanical, elevator fire and security systems in accordance with all applicable life safety codes and/or in accordance with all requirements of the project drawings and related specifications.
   d. Coordinate with all affected systems providers to ensure the proper integration and performance requirements of all Division 28 systems as required by Code, Contract Documents, and the AHJ.
2. Where applicable, Contractor shall coordinate all service, rework, and relocation of existing utilities. Bid shall include all work required for any connections/interfacing with existing systems and/or utilities.
3. Refer to related specification sections for additional information.
   a. Contractor shall coordinate all work with vendors for rework, relocation, and addition of equipment and devices, including any modification to existing system infrastructure.
4. Coordinate all work involving tenant leased areas or equipment for rework, relocation, and addition of equipment and devices with the Authority.

1.3 REFERENCES

A. References to industry and trade association standards as well as all building codes are minimum installation requirements. The codes, standards and agencies listed below shall form a part of all related specification sections and all work shall comply with the latest adopted standards.

B. Authority Having Jurisdiction: The system shall comply with all applicable Codes, Ordinances and Standards as interpreted and enforced by the local authority having jurisdiction.

C. Local Adoption and Amendments: Follow the locally adopted version of all codes and standards. Where local jurisdictions or governments include amendments to codes including the National Electrical Codes, national health & safety codes, radio frequency regulations, or other building codes, the Contractor shall follow the locally amended versions and amendments.

D. Publication Dates: Comply with published standards in effect as of date of the Contract Documents unless otherwise indicated.
   1. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity.
   2. Copies of applicable standards are not bound with the Contract Documents.
   3. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

E. Where the contract drawings and specifications mandate a greater requirement or performance than those specified by any of the below referenced codes and standards, the Contract Documents shall then be the governing requirements for this project. The minimum codes and standards to be applied for this project shall be the following;
   1. National Fire Protection Association (NFPA):
      a. NFPA-70: National Electrical Code (NEC)
      b. NFPA-72: National Fire Alarm and Signaling Code
      c. NFPA-75: Standard for the Protection of Information Technology Equipment
      d. NFPA 76: Standard for the Fire Protection of Telecommunications Facilities
      e. NFPA-101: Life Safety Code
      f. NFPA 1221: Standard for the Installation, Maintenance and Use of Emergency Services Communications Systems
      g. NFPA 780: Standard for the Installation of Lighting Protection Systems
   2. American National Standards Institute (ANSI) / Telecommunications Industry Association (TIA):
      a. ANSI/TIA-455-61 FOTP-61: Measurement of Fiber or Cable Attenuation Using an OTDR
      b. ANSI/TIA-455-78 FOTP-78 / IEC 60793 Optical Fibers Part 1-40: Measurement Methods and Test Procedures, Attenuation
      c. ANSI/TIA-526-7: Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant (Method A)

d. ANSI/TIA-526-14-C: Measurement of Optical Power Loss of Installed Multimode Fiber Cable Plant
e. ANSI/TIA-568-D.0 : Generic Telecommunications Cabling for Customer Premises
f. ANSI/TIA-568-D.1: Commercial Building Telecommunication Standard
g. ANSI/TIA-568-D.2: Balanced Twisted-Pair Telecommunication Cabling and Components Standard
h. ANSI/TIA-568-D.3: Optical Fiber Cabling Components
i. ANSI/TIA-569-D: Telecommunications Pathways and Spaces
j. ANSI/TIA-606-B: Administration Standard for Telecommunications Infrastructure
k. ANSI/TIA-607-C: Commercial Building Grounding and Bonding Requirements for Telecommunications
l. ANSI/TIA-758-B: Customer Owned Outside-Plant Telecommunications Infrastructure Standard
m. ANSI/TIA IS-811: Telephone Terminal Equipment, Performance and Interoperability for VoIP Feature Telephones.
n. ANSI/TIA-854: Full Duplex Ethernet Specification for 1000Mbps Operating Over Category 6 Balanced Twisted Pair Cabling
o. ANSI/TIA-862-A: Building Automation Systems Cabling
p. ANSI/TIA-1005-A: Telecommunications Infrastructure Standard for Industrial Premises
q. ANSI/TIA-1152: Requirements for Field Test Instruments and Measurements for Balanced Twisted-Pair Cabling
r. ANSI/TIA-1183: Measurement Methods and Test Fixtures for Balun-Less Measurements of Balanced Components and Systems

3. Motorola
   a. R56 Standards and Guidelines for Communication Sites
4. Americans With Disabilities Act (ADA) 2014 ADAAG.
5. Underwriters Laboratories, Inc.:
   a. UL 486A: Wire connectors and soldering lugs for use with copper conductors
   b. UL 1449: Transient Voltage Surge Suppressors
   c. UL 1581: Standard for Electrical Wires, Cables, and Flexible Cords
   d. UL 1666: Standard for Test for Flame Propagation Height of Electrical and Optical-Fiber Cables Installed Vertically in Shafts
   e. UL 478: Standard for Electronic Data-Processing Units and Systems
   f. UL 83: Thermoplastic-Insulated Wires and Cables
   g. UL 910: Test Method for Fire and Smoke Characteristics of Cables Used in Air-Handling Spaces." Provide products which are UL-listed and labeled.
   h. UL 969: Standard for Marketing and Labeling.
   i. UL Certified: UL's LAN Cable Certification Program
6. International Code Council
   a. New Jersey Building Code (2015) Accessibility
   b. New Jersey Building Code (2015) Building
   c. New Jersey Building Code (2015) Energy Conservation

d. New Jersey Building Code (2015) Mechanical
e. New Jersey Building Code (2015) Plumbing

7. New Jersey Fire Prevention Code (2015)
8. Institute of Electrical and Electronic Engineers (IEEE)
   a. IEEE 802.1, Bridging and Management
   b. IEEE 802.3, Standard for Ethernet (2012 with published amendments)
   c. IEEE 802.11 Wireless LANs
9. NEMA/ICEA Compliance:
   a. WC-5 - "Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy,"
   b. WC30 - "Color Coding of Wires and Cables," pertaining to control and signal transmission media.
10. Internet Networking Standards: Network hardware and software shall be able to communicate with the Internet and provide for the creation of IP based networks for the Agency. All supplied hardware shall comply with the following minimum standards and RFC's as appropriate.
    a. RFC 950 - Internet Standard Sub-Netting Procedure
    b. RFC 1140 - Official Protocol Standards
    c. RFC 1156 - MIB Base for IP Networks
    d. RFC-1213 - MIB-II
    e. RFC-1757 - Remote Monitoring (RMON)
    f. RFC 1157 - Simple Network Management Protocol
    g. RFC 1720 - TCP/IP, OSI Compliant
    h. RFC 1918 - Address Allocation for Private Subnets
    i. RFC 1583 - OSPF, Version II
    j. RFC 1723 - RIP -II
11. ASTM Compliance: Comply with applicable requirements of D-2219 and D-2220. ASTM Compliance: Comply with applicable requirements of D-2219 and D-2220.
12. Building Industry Consulting Service International (BICSI)
    a. ANSI/BICSI-002, Data Center Design Standard and Recommended Practices
    b. Electronic Safety and Security Design Reference Manual (ESSDRM)
    c. Information Technology Systems Installation Manual (ITSIMM)
    d. Outside Plant Design Reference Manual (OSPDRM)
    e. Telecommunications Distribution Methods Manual (TDMM)
13. Safety Code for Elevators and Escalators – American Society of Mechanical Engineers (ASME 17.1).
14. Federal Communications Commission:
    a. FCC Regulations Part 15 Title 47.
    b. FCC: Federal Communication Commission Part 68 as modified by Wiring Docket 88-57.

F. The following line items shall be defined as follows:

1. Headend and Software: Includes any servers, management/administrative software, software licenses, and components which serve the purpose of performing system-wide coordination, monitoring, data processing, control and other global functions. Refer to related specification sections for additional information.
2. Interfaces: Includes all hardware, software, wiring, cabling, programming, interface devices and appurtenances as required for communication between systems, or between a given system and an operator to provide the specified functionality. Refer to related specification sections for additional information.
3. Network Switch: Includes layer 2 (access / distribution) or layer 3 (core / router) network switches to connect a system to the Local Area Network (LAN). Refer to related specification sections for additional information.
4. Backbone Cable: The segment of the premises distribution system that provides connection between telecommunications spaces. Refer to specification section 27 10 00 for additional information.
5. Horizontal Cable: The segment of the premises distribution system that provides connectivity from communications rooms to field devices. Refer to specification section 27 10 00 for additional information.
6. Field Devices: Components of a system which are served by the system headend and are the network endpoint or "edge" device. Refer to individual specification sections for additional information.

1.4 SYSTEMS DESCRIPTIONS

A. At the minimum, the scopes of work covered by the Division 27 Specifications and the contract drawings shall include but are not limited to the systems described by the specification sections listed in 1.1.

B. This Section includes the requirements for all 27 Communications and 28 Electronic Safety and Security Systems. Requirements of this section shall apply to work described in Sections referenced in 1.1.

C. Additional System specific requirements may be included in the Sections referenced in 1.1. The Contractor shall meet the requirements in this Section in additional to those specific requirements for each System. Where common work results within this Section conflict with Sections listed in 1.1, the more stringent shall apply.

1.5 SUBMITTALS

A. In addition to all submittal requirements as stipulated by Division 01 and any related specifications sections, the Contractor shall provide all submittals in accordance with the following:
   1. The Authority approvals shall be obtained for all equipment and material before delivery to the job site. Delivery, storage, or installation of equipment or material which has not had prior approval will not be permitted at the job site.

2. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings, and other data necessary for the Authority to ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify equipment being submitted.
3. Prior to any submission the contractor shall be responsible for performing the following quality control items to ensure compliance with all project requirements:
   a. Review all Shop Drawings and Product Data
   b. Review all field measurement criteria.
   c. Review all field construction criteria and methodologies.
   d. Review all catalog numbers and similar data.
   e. Review all coordination requirements of affected trades.
   f. Review conformance to all appropriate specification sections.
4. The Contractor shall have a registered RCDD professional review and seal shop drawings related to network designs, installations, testing, certifications, and structured cabling layouts for communications systems confirming that the proposed network infrastructure is in conformance with all stipulated standards and requirements as herein specified. Failure to provide RCDD sealed shop drawings shall result in all shop drawings being returned for resubmission without any reviews taking place.
5. The Authority's review of the shop drawings and/or samples does not relieve the Contractor from compliance with the requirements of the Contract documents. Unless the Contractor has informed the Authority in writing of such deviation at the time of submission, has noted the deviation on the shop drawings, has given written approval of the specific deviation to the project document, all project requirements shall stand. The Authority's review also does not relieve the Contractor from responsibility for any errors of omission in the submission of shop drawings and/or samples.
6. Submit all system testing, commissioning and startup procedures to be employed. Include all estimated times for performance of all tests, all test equipment and manpower necessary for testing.
7. Submit all sub-contractor qualifications and certifications in accordance with the requirements as specified elsewhere in this specification section.
8. Submit project schedule including, but not limited to, outlining the time frames for all equipment with long lead times for equipment deliveries; include all system commissioning, testing, and training time expectations. Project schedule shall be submitted as CPM schedule and shall utilize a software based project management program.

B. In addition to items to be furnished and installed under this Contract, this project consists of items to be furnished and/or installed by the Authority and Authority Vendors. In order to provide for comprehensive review of all system designs by the Authority, the contractor shall obtain all items and related information required as part of standard submittals from the Authority and or Authority Vendor(s) for Vendor furnished equipment and submit them as part of the Contractor's submittal packages for each system.

C. The Contractor shall schedule submittals to maintain the project schedule. For coordination requirements refer to Division 01 Specification Section, which outline basic submittal requirements and coordination. All Division 01 and related Specification Sections requirements shall be used in conjunction with all requirements as herein specified.
   1. Submittals shall be provided as a complete submission; no partial submissions will be accepted. Failure to provide a complete submission shall result in all submittals being returned for resubmission.
      a. In addition to all paper submission requirements as stipulated by Division 01 the Contractor shall also submit one complete set of electronic submittals in a PDF format.
   2. No substituted equipment shall be reviewed without prior approval in accordance with the requirements of "substitutions" under Division 1 Specification Section.
   3. Mark the submittals, "SUBMITTED UNDER SECTION__."
      a. Submittals shall be marked to show specification reference including the section and paragraph numbers.

D. All shop drawings shall be prepared using latest version of AutoCAD or REVIT, drawn accurately, and in accordance with the Authority's Standards. The Contractor shall not reproduce the Contract Documents or copy standard information as the basis of the technical data, hand drawn mark-ups of the original project drawings shall not be acceptable. Failure to provide a complete set of "contractor prepared" installation drawings at the time of submittal shall result in all submittals being returned for resubmission.
   1. Submission Packaging: The Contractor shall organize the submissions according to the following packaging requirements.
      a. Electronic Copy Submission: One complete set of electronic equipment data sheets and drawings submitted in PDF format and collated in two distinct files:
         1) Equipment Data Sheets, equipment schedules, alarm matrixes cable termination spread sheets, and all related pertinent information.
         2) Drawings including all site plans, floor plans, risers, point to point wiring, grounding, installation details and mounting elevations.
      b. Hard Copy Submission: Submit hardcopies of all shop drawings and product datasheets in accordance with the requirements the of Division 01 Specifications

E. Software
   1. The Contractor shall provide software submittals including manufacturer's/developer's documentation for each type of software used in the project. Documentation shall include, at a minimum:
      a. Complete description of software features, proposed options and functionality.
      b. Software version and revision identification.

c. Software manufacturer's contact information for technical support, including address, telephone numbers, fax numbers and e-mail/web URLs
d. Well-commented source code and an executable version for all custom and special purpose software. Source code shall be delivered in both hard copy and machinereadable formats on a media acceptable to the Authority. All compilers, case tools, utilities, etc. that are needed to create the executable code shall be included.

F. Delays
1. Contractor is responsible for any delays in job progress accruing directly or indirectly from late submissions or resubmissions of shop drawings, or product data.

G. Re-submittals
1. Submitted items, found unsuitable, rejected or returned for revision by the Authority, shall be reworked by the Contractor and resubmitted.
2. Review of Contractor's submittals by the Owner's Representative will be limited to examination of an initial submittal and one (1) resubmittal. The Authority reserves the right to obtain reimbursement from the Contractor for amounts paid to the Owner's Authorized Representative for evaluation of any additional resubmittals due to incomplete information or non-compliance to the project documents on the part of the Contractor. An incomplete submittal shall count as a submittal (either initial or a resubmitted as the case may be).

H. Shop Drawings
1. All shop drawings shall include sufficient information, clearly presented, to determine full compliance with all project drawings and specifications. At the minimum include the following information as applicable for review. Failure to provide all information listed below shall result in all shop drawing submittals being returned for resubmission:
a. All Building Floor and Site Plans.
b. All equipment, devices and components with manufacturer's name(s), model numbers,
c. All equipment, device and component electrical ratings and power requirements
d. All equipment, device, and component performance ratings.
e. All equipment /device battery calculations,
f. All equipment /device cable voltage drop calculations,
g. All dB losses for all fiber optic devices and cabling,
h. All dB losses for all coaxial cabling taps and devices
i. All Speaker taps, voltages and zoning
j. All equipment rack/cabinet layouts and rack/cabinet sizes.
k. All device-mounting elevations.
l. All device wiring details.
m. All grounding and bonding connections.
n. Complete point-to-point-wiring diagrams for all systems. Include all equipment and wiring termination schedules and/or matrices.

o. Equipment, devices, cabling, and work related to Authority and Authority-Vendor furnished and/or installed work.

2. Provide a complete set of "contractor prepared" installation drawings. Drawings at the minimum shall consist of all floor plans indicating all passive and active electronic component locations, field devices, device identifications, distribution racks, patch panels, control panels, auxiliary control panels, power supplies, conduits, cable trays, and cabling distribution, as well as all 120-volt electrical circuit locations and designations.
   a. Drawings shall be made at 1/8" = 1'-0" scale. Drawings shall include at the minimum the following:
      1) Detailed equipment layouts for all communications rooms. Coordinate all room layouts with affected trades.
      2) Floor plan drawings showing locations of all equipment, devices, equipment cabinets and/or rack locations. Identify type and sizes of all equipment cabinets and/or racks.
      3) All cable tray layouts, and conduit routing of all conduits 2 inches in diameter or greater.
      4) All equipment rack layouts showing locations of all rack mounted equipment items.
      5) System riser diagrams and single line drawings, showing detailed connections for all parts of the system, including wire numbers, terminal block numbers and layouts, and other designations and codings (point-to-point wiring diagrams). System performance measurements shall be documented as specified.
      6) Equipment wattage for each location and estimated BTU production.
      7) Detailed equipment layouts for all equipment consoles. Indicate all equipment locations, power connections, and installation details.
      8) All equipment mounting hardware/brackets and installation details, identify type size, load capacities of all mounting hardware/brackets; include all mounting and installation details, all space requirements, any special architectural modifications required.
      9) Outline drawings of all equipment cabinets/racks showing the relative position of all major components, all-wiring and grounding terminations. Include all panel, cabinet and/or rack dimensions.
      10) Point-to-point wiring diagrams for all cabling. Include all cable drop identification at edge device and at termination equipment. Include complete wiring termination schedules.
      11) All grounding and bonding termination points
      12) All electrical circuit numbers and distribution panel locations.
      13) Equipment, devices, cabling, and work related to Authority and Authority-Vendor furnished and/or installed work.

3. Provide a complete termination schedule of all communications device drop/outlet locations. Indicate on the installation drawings all device drops/outlet locations, termination room locations, unique identifications, cable types, cable distances and all pertinent data to properly evaluate the performance and capabilities of each cable run.
4. All drawings shall be prepared using an AutoCAD- or REVIT-based program; hand drawn mark-ups of the original Contract Drawings shall not be acceptable. Failure to provide a complete set of "contractor-prepared" shop drawings at the time of submittal shall result in all submittals being returned for resubmission.
5. Provide a sleeve layout for all penetrations through the Parking Garage post tensioned concrete structure. Coordinate with Structural, Mechanical, Plumbing, Electrical, and Fire Protection Contractors. Submit sleeve layout no later than eight weeks prior to forming the post tensioned concrete.
6. All shop drawings shall include related trades for coordination. Related trades include, but are not limited to architectural, structural, mechanical, electrical, plumbing, fire protection, interiors, FFE, signage, wayfinding, and similar elements.

I. Equipment Submittals:
1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.
   a. Include all equipment data sheets pertinent to equipment provided. All data sheets shall be highlighted and annotated indicating specific equipment and options supplied. Failure to provide the proper annotation of <u>all</u> equipment shall result in submittals being returned for resubmission.
2. Submit complete technical data necessary to evaluate the material and equipment. Include a complete technical specification for the submitted equipment, noting differences and adherence to this Section. Failure to provide the required data will result in all submittals being returned for resubmission.
3. Submit performance data, equipment ratings, cable requirements, control sequences, GUI based control panels, programming matrices, logic diagrams and all other descriptive data necessary to describe the installation and operations of the system being provided. Failure to provide the required data will result in all submittals being returned for resubmission.
4. Parts list, which shall include those replacement parts recommended by the equipment manufacturer, quantity of parts, current price, and availability of each part.
5. Equipment, devices, cabling, and work related to Authority and Authority-Vendor furnished and/or installed work.

J. Maintenance and Operation Manuals: Submit in accordance with all requirements of Division 01 Specification Section and as herein specified.
1. Maintenance and Operation Manuals: Submit as required for systems and equipment specified in the technical sections. Furnish four copies, bound in hardback binders, (manufacturer's standard binders) or an approved equivalent. Furnish one complete manual as specified in the technical section but in no case later than prior to performance of systems or equipment test and furnish the remaining manuals prior to contract completion.

2. Inscribe the following identification on the cover: the words "Maintenance and Operations Manual”, include the name and location of the system, equipment, building, name of Contractor, and contract number. Include in the manual the names, addresses, and telephone numbers of each subcontractor installing the system or equipment and the local representatives for the system or equipment.
3. Provide a "Table of Contents" and assemble the manual to conform to the table of contents, with tab sheets placed before instructions covering the subject. The instructions shall be legible and easily read, with large sheets of drawings folded in.
4. Furnish (1) copy of all Maintenance and Operation Manuals in PDF format on DVD media or flash drive.
5. The manuals shall include:
   a. Internal and interconnecting wiring and control diagrams with data to explain detailed operation and control of the equipment.
   b. A control sequence describing start-up, operation, and shutdown.
   c. Description of the function of each principal item of equipment.
   d. Installation and maintenance instructions.
   e. Safety precautions.
   f. Diagrams and illustrations.
   g. Testing methods.
   h. Performance data.
   i. Pictorial "exploded" parts list with part numbers. Emphasis shall be placed on the use of special tools and instruments. The list shall indicate sources of supply, recommended spare parts, and name of servicing organization.
   j. Appendix; list qualified permanent servicing organizations for support of the equipment, including addresses and certified qualifications.
6. Approvals will be based on complete submission of manuals together with shop drawings.

1.6 QUALITY ASSURANCE

A. Quality Assurance services as described below shall be provided by the Contractor. The Authority will only provide Quality Assurance inspection.
   1. Quality Assurance services described in this section are a portion of the quality assurance activities which may be necessary to achieve full compliance with the Contract Documents and are not intended to limit the activities of the contractor.
   2. These provisions do not relieve the contractor of providing quality control services or other inspections to the Authority or authorities having jurisdiction over this project.
   3. A quality assurance supervisor whose responsibility it is to ensure compliance with the contract documents shall be included in the quality assurance program. This person shall be assisted by other quality assistance staff as warranted by the specific construction activities and workload.
   4. The Contractor’s Quality Assurance Supervisor shall submit signed Quality Assurance Summary reports to the Authority. These reports shall address both project progress and project quality control activity.

B. Quality Assurance Program
   1. The Contractor shall establish a Quality Assurance Program to perform inspection and tests of all items of work. This Program shall insure conformance to applicable specifications and drawings with respect to the materials, codes, workmanship, construction, finish, functional performance, and identification. This Program shall be established for all system rollout and phasing plan work performed under this Contract. The Contractor's Quality Assurance Program shall specifically include surveillance and tests required in the technical provisions of the specifications.
   2. The Contractor shall describe its Quality Assurance Program in detail. Descriptions shall be given for at least the following:
      a. Organization
      b. Inspection
      c. Testing
      d. Documentation
      e. Administration
      f. Quality Awareness and Training
      g. Forms
      h. Schedules
      i. Submittals
   3. Before the Contractor's Quality Assurance Program description is submitted, the Contractor shall meet with the Authority and discuss the Contractor's Quality Control Plan. The meeting shall develop a mutual understanding of the details of the plan, including the forms to be used for recording the quality assurance operations, inspections, administration of the plan for both on-site and off-site work, and the interrelationship of the Contractor and the Authority inspection. The Contractor shall prepare meeting minutes which shall be incorporated in the Contractor's Quality Assurance plan.

C. Contractor qualifications: Each contractor or sub-contractor shall be an accredited and authorized distributor of the appropriate equipment manufacturer and shall be fully certified in the installation, testing and programming of all equipment being provided. These qualifications shall be submitted and approved by the Authority for all persons performing work on the system.
   1. The contractor shall be capable of providing documented successful work experience of at least three (3) facilities of equivalent size and technical requirements utilizing the proposed equipment being provided. The contractor shall have on staff a minimum of one full time individual that holds a current RCDD registration.
      a. Experience shall be defined as the completion of the specific system being provided, with that system being successfully operated for its intended purpose for at least three (3) years.
      b. In addition to the above "Experience" shall also be defined as the completion of modifications and renovations to any associated system being provided in any existing occupied facility of this size and magnitude.
      c. For each facility submit the following:
         1) Name and location of facility

2) Date of Occupancy or beneficial use by Owner
3) Owner's representative to contact and telephone number
4) Construction Manager or General Contractor
5) Project Architect or Engineer
6) Provide information on the installed locations with operational equipment
7) Registration number and expiration date of RCDD professional
8) Registration number and expiration date of Level II installer.

2. All information technology system work shall be certified in writing to the Authority by the contractor's on-staff RCDD professional asserting that all communications network system shop drawings and structured cabling is in conformance with all appropriate NEC requirements, EIA/TIA standards, and all related specification sections.

D. Cable Installer Qualifications: The cable installation contractor shall demonstrate not less than three (3) years' experience in the installation of structured cabling systems and shall have on staff a minimum of one full time member that holds a current BICSI level II installer credential.

1. NOTE: The installation of all communications cabling shall be under the direct supervision of a current BICSI level II installer who shall be knowledgeable in the following technical applications:
   a. The Routing and installation of shielded, unshielded, twisted pair, coaxial and fiber optic cables.
   b. Bonding and grounding of cable tray and equipment racks.
   c. Fusion splicing of fiber optic cabling.
   d. Testing copper conductors for electrical continuity.
   e. Testing and Certifying of UTP structured cabling for attenuation and worst case near end cross talk.
   f. Testing and Certifying of ALL fiber optic cabling employing an Optical Time Domain Reflectometer (OTDR) in accordance with TIA/EIA protocols.
   g. Testing and Certifying of coaxial cable networks for RF leakage
   h. Termination, connection, and testing of shielded and un- shielded twisted pair cable, coaxial cabling, and fiber optic cabling on all specified connectors, electrical protection blocks, termination blocks, and patch panels.
   i. Generally accepted industry standards, as well as manufacturers written installation instructions, will be used for in-process quality control and final acceptance of the work installation.

E. Service Qualifications: All sub-contractors shall be a permanent service organization maintained and/or trained by the product manufacturer on the products being provided for this project.

1. The sub-contractors shall be (where required) properly licensed by the governing municipality to provide the services and work for the specific system being installed. In addition, all sub-contractors shall be capable of providing full service for the entire warranty period within an 8-hour response time upon notification of a service emergency.

F. Manufacturer's Qualifications: The manufacturer shall regularly and presently produce, as one of the manufacturer's principal products, the equipment and materials specified for this project, and shall have manufactured the items for at least three years.
   1. Product Qualification: The Manufacturer's product shall have been in satisfactory operation, on three installations of similar size and type as this project, for approximately three years. The Authority reserves the right to require the Contractor to submit a list of installations where the products have been in operation for the specified period of time prior to approval of shop drawings.
      a. The manufacturers shall submit the appropriate documentation certifying that the installing sub-contractor is a qualified service provider of all manufacturers' products being provided for this project.
   2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

G. Non-Compliance
   1. The Authority may notify the Contractor of any non-compliance with the foregoing requirements. The Contractor shall, after receipt of such notice, immediately take corrective action. Any notice, when delivered to the Contractor or its representative at the site of the work, shall be considered sufficient notice.
   2. If the Contractor fails or refuses to comply promptly, the Authority may issue an order stopping all or part of the work until satisfactory corrective action has been taken. It is understood and agreed to the following:
      a. Time lost due to any such stop order is the responsibility of the Contractor.
      b. Costs to repair, replace or otherwise remedy the defective work are the responsibility of the Contractor.
      c. Costs incurred by the Authority to correct defective work shall be deducted from the total amount due the Contractor. An amount may be withheld from the payment due the Contractor to recoup expenses incurred by the Authority due to non-compliance.
   3. In cases where implementation of the Quality Assurance Program does not comply with either the Contractor's Quality Assurance Plan or the Contract Provisions, or where the Contractor fails to properly operate and maintain an effective Quality Assurance Program, the Authority may:
      a. Order the Contractor to replace ineffective or unqualified quality control personnel.
      b. Assign the Authority or contracted outside professional staff to carry out the functions and operations of the Contractor's approved Quality Assurance Plan. Costs incurred by the Authority to operate a Quality Assurance Program or to otherwise remedy the Contractor's non-compliance with quality-related provisions of the contract shall be deducted from the total amount due the Contractor.

1.7 DELIVERY, STORAGE AND HANDLING

A. In addition to the requirements below, refer to specific related specification sections for additional requirements.
   1. Contractor shall store all equipment and materials in a climate-controlled environment. Storage environment shall, at a minimum, comply with the following:
      a. Temperature not to exceed: -20˚ C to +70˚ C (-4˚ F to + 158˚ F)
      b. Relative humidity of 5% to 95%, non-condensing.
   2. Where manufacturer's storage requirements are more restrictive than those listed above, store such equipment and/or materials in compliance with all manufacturer's requirements.
   3. Do not store equipment or materials in areas where fire or explosion hazards exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers. Do not store equipment or materials in areas subject to corrosive agents, liquids or gasses.
   4. Do not store equipment or materials in areas that contain potential water hazards (including, but not limited to, restrooms, kitchens, or mechanical spaces), or adjacent to liquid-carrying pipes.

B. Contactor shall store materials only in areas designated by the Authority.

C. The Contractor shall coordinate product delivery and movement to installation locations with the Authority within both on- and off-hour periods as required to minimize impact to the Airport operations.

D. The Contractor shall be responsible for product shipment, delivery and storage/staging/testing location onsite. The Contractor shall coordinate with the Authority regarding site readiness and refer to architectural drawings regarding placement.

E. The Contractor shall provide a security plan for approval by the Authority describing the methods, areas, and access for equipment. The plan shall include how equipment will be securely stored and accessed by the Contractor within communications rooms, MDFs, IDFs, control rooms, and similar spaces throughout construction.

1.8 RECORD DOCUMENTS

A. In addition to all general provisions of the Contract, including but not limited to all; General and Supplementary Conditions, Division 01 Specification Sections include the following project requirements;
   1. Provide complete set of finalized copies of record documents prior to final acceptance of the project by the Authority in accordance with all requirements of Division 01 specification sections. At the minimum the record documents shall contain all information, data, and drawings as described in the "Submittals" paragraph of this specification section as well as all shop drawing requirements of related specification sections.

a. As-built documents shall be submitted in both paper and electronic media formats in the quantities as specified by Division 01 specification requirements.
   1) All electronic record drawings shall be prepared and submitted utilizing an AutoCAD- or REVIT-based program as manufactured by Autodesk. Where electronic documents are prepared using other than an AutoCAD or REVIT program manufactured by Autodesk, the contractor shall provide to The Authority the necessary software to electronically view the submitted documents.
   2) All electronic data sheets, control sequences, programming matrices and other descriptive data shall be provided in PDF formatted documents.
   3) Copies of all current system programming and associated software shall be provided on downloadable media formatted for the use in restoration all system operations and functionality in the event of a catastrophic failure.

1.9 OPERATION AND MAINTENANCE

A. Refer to specific related specification sections for requirements in addition to the following.

B. Provide complete set of operating and maintenance manuals in accordance with all requirements of Division 1 and related Division 27 specification sections. The manuals shall include all operational programming and maintenance information for the system being provided. Edit all manuals specific to the installation of the provided system; manufacturer's documentation alone shall not be acceptable. Include all, manufacturer's technical data sheets, programming matrixes and graphic screen representations.

C. Include all As-built drawing documentation of all systems. Drawings shall reflect all requirements of the "Submittals" and "Record Documents" paragraphs of this specification section.

D. Operations Manuals
   1. Provide a clear and concise sequence of operation that gives, in detail, the information required to properly operate all equipment and systems. Include detailed programming matrixes, indicating at the minimum all manual and automatic functions for all system, components and devices comprising the system being provided.

E. Maintenance Manuals
   1. Include maintenance instructions and other descriptive material as received from the manufacturer to enable designated personnel to maintain and test equipment.
   2. Include descriptions, specifications, layout drawings (showing component types and positions), and back-panel and assembly wiring diagrams.

3. Provide instructions for preventative maintenance procedures that include examinations, tests, adjustments and periodic cleaning.
4. Provide guidelines for isolating the causes of hardware malfunctions and for localizing faults.

1.10 SOFTWARE AGREEMENT

A. The Authority shall retain the ownership and access rights of the source code for all custom system programs and software specifically developed and/or modified as part of this project. Additionally, the Authority shall retain ownership of all software licenses for "off the shelf" software furnished and installed as part of this project.
   1. The contractor shall provide to the Authority complete copies of all current software programming and software licenses related to the operation of each system prior to final acceptance of the related Contract scopes of work.
      a. All programming shall include but not be limited to all device identifications, device descriptions, Programming Logic Matrices, all program access level passwords as well as all function and sub-function routines.
   2. Programming and software copies shall be provided to the Authority on DVD digital formatted media or flash drive. In addition, the contractor shall provide a complete hard copy printout of all system programming and shall be included as part of closeout documentation for review by the Authority.

B. Software and firmware upgrade provisions shall be included as part of this specification requirement and shall include the automatic upgrades as required to maintain all software and firmware to the manufacturers most current revision on all system components installed and or modified as part of this project for duration of the warranty period. This upgrade policy shall require the contractor to install, test, and certify all software and firmware upgrades that become available from manufacturer for a period of one year from date of final acceptance to the expiration of the warranty.
   1. Upgrading of software shall include all revised/new software, labor, testing certification as well as all licenses, software and all programming copies as described in the Record Documents paragraph of this section associated with the installation of all revised software.
   2. These updates shall be accomplished in a timely manner, fully coordinated with the system operators, and incorporated into the operations/maintenance and software documentation manuals.
      a. One (1) scheduled final update shall be provided near the end of the warranty period, at which time the Contractor shall install and validate the latest released version of the Manufacturer's software and firmware for all systems installed and/or modified for this project.
      b. All software changes shall be recorded in a log maintained in the unit control. An electronic copy of the most current software update shall be maintained within the log.

1) At a minimum, the contractor shall provide a description of the modification, when the modification occurred, and name and contact information of the individual performing the modification. The log shall be maintained in a white 3 ring binder and the cover marked “Software Change Log.”

3. Provide not less than thirty days' notice to the Authority to allow scheduling and access to system and to allow the Authority to upgrade computer equipment if necessary.

1.11 SPARE MATERIAL

A. In addition to all general provisions of the Contract, including but not limited to all; General and Supplementary Conditions, Division 01 Specification Sections refer to related Specification Sections “Extra Material” for specific requirements.

B. All spare materials shall be provided at the time of final acceptance of the project and a signed packing list shall be obtained at the time of delivery. At no time is the contractor to use the spare materials provided for this project to replace malfunctioning or damaged equipment and or components.

1.12 ENVIRONMENTAL CONDITIONS

A. Systems, components, devices materials, and equipment shall be capable of withstanding the environmental conditions of the space without mechanical or electrical damage or degradation of operating capabilities or performance.

1. Interior, Controlled Environment: System components, installed in temperature-controlled interior environments shall be rated for continuous operation in ambient conditions of 2 to 50 °C (36 to 122 °F) dry bulb and 20 to 90 percent relative humidity, non-condensing and shall utilize NEMA 250, Type 1 enclosures.
2. Interior, Uncontrolled Environment: System components installed in non-temperature-controlled interior environments shall be rated for continuous operation in ambient conditions of -18 to 50 °C (0 to 122 °F) dry bulb and 20 to 90 percent relative humidity, non-condensing and shall be installed in NEMA 250, Type 4X enclosures.
3. Exterior Environment: System components, conduits and back-boxes installed in locations exposed to weather shall be rated for continuous operation in ambient conditions of -34 to 50 °C (-30 to 122 °F) dry bulb and 20 to 90 percent relative humidity, condensing. Rated for continuous operation where exposed to rain as specified in NEMA 250, winds up to 137 km/h (85 mph) and snow cover up to 610 mm (24 in) thick shall utilize NEMA 250, Type 4X enclosures.
4. Hazardous Environment: System components, conduits and back- boxes located in areas where fire or explosion hazards may exist because of flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers shall be rated, listed, and installed according to NFPA 70.

5. Corrosive Environment: System components, conduits, and back- boxes subjected to corrosive fumes, vapors, and wind-driven salt spray in coastal zones, shall utilize NEMA 250, Type 4X enclosures.
6. Submersible Environment: System components, conduits and back-boxes subjected to prolonged submersion in water, shall utilize NEMA 250, Type 6P enclosures.
7. Areas where equipment and devices may be subject to damage by the general population shall be installed in vandal resistant enclosures.
8. Console: All console equipment shall, unless noted otherwise, be rated for continuous operation under ambient environmental conditions of 15.6 to 29.4 °C (60 to 85 °F) and a relative humidity of 20 to 80 percent.

PART 2 - PRODUCTS

2.1 MANUFACTURED PRODUCTS

A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, that meet and/or exceed the specified performance and features of the equipment and/or systems and for which replacement parts shall be readily available to the contractor and/or using agency. The equipment specified is based on the acceptable manufacturers listed. Where "or equal" is stated, equipment shall be equivalent in every way to that of the equipment specified, and subject to approval.
   1. When more than one unit, device, or component of the same class of equipment is required, such units, devices, or components shall be the product of a single manufacturer.
   2. Acceptable manufacturers for each system shall be as specified and shall be provided in full compliance with the requirements of this and all related specification sections and contract drawings.
      a. Manufacturers listed as acceptable shall not negate the contractors' responsibility for providing all equipment, devices, components, and/or systems, in accordance with all functions and performance requirements of the Contract Documents.
      b. Where manufacturer and/or manufacturer model numbers reference specific system components in the related specification sections, it is to establish the performance requirements and quality of the systems and components only.
         1) It is in no way an inference that the referenced model numbers are the manufacturer's current product and are the only acceptable components for this project unless specifically referenced as "no substitutions."
      c. Equivalent UL- listed equipment may be substituted for the approved manufacturers unless stipulated by other Specification Sections as "No Substitutions." All substitutions shall be submitted for approval by the Authority in accordance with all requirements of Division 01 Specification Sections and Chapter 1.4 "Submittals" chapter of this Specification Section.

1) Where systems and/or components are referenced as "no substitutions" the specific system and/or components shall be provided.
2) All substitutions shall comply with all requirements as specified above and all system performance standards shall be maintained.
3) The contractor shall stipulate the following information impacted by such a substitution.
   a) Any and all extensions in time impacted by the substitution.
   b) Any changes to the architectural or structural elements to the project
   c) Differences in operation and/or performance from intended system criteria.
4) Failure to provide the required substitution information shall result in "without consideration" the immediate rejection of the substituted equipment and/or systems.

3. Due to the rapid advancement and antiquation of hardware technology, the supplied hardware shall be the "contemporary technical and operational equivalent" of the specified hardware. The following requirements shall be met:
   a. Contemporary technical and operational equivalent shall be based on a comparison of technology at the time of publication to the technology at the time of ordering the equipment.
   b. Hardware shall be ordered as close to the actual installation date for a given phase as reasonable (i.e., latest responsible date). Final hardware approval and scheduled order date are at the sole discretion of the Authority.
   c. Hardware equivalence shall be based on both technical equivalence and operational equivalence.
   d. Contemporary technical equivalence shall be based on device performance and class specifications.
   e. Contemporary operational equivalence shall be based on industry standards and function.

B. Equipment Assemblies and Components:
   1. Components of an assembled unit need not be products of the same manufacturer.
      a. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.
      b. Components shall be compatible with each other and with the total assembly for the intended service.
      c. Constituent parts which are similar shall be the product of a single manufacturer.
      d. Factory wiring shall be identified on the equipment being furnished and on all wiring diagrams.

C. Compatibility and Interoperability of System Components and Devices

1. Where multiple components, devices, and/or systems are intended to be interconnected and components of a complete system in accordance with any related specification sections, it shall be the Contractor's responsibility to verify interoperability and compatibility of said components, devices, and/or systems in full conformance to the specified performance criteria prior to the submission of shop drawings.
2. Where specified devices are found to be incompatible or incapable of performing as specified in a seamless manner, the contractor shall notify the Authority in writing prior to submission of shop drawings. Failure to properly identify such functional discrepancies shall not relieve the contractor from providing a complete and fully functional system in accordance with the requirements of all related specification sections.

D. Where Factory or Off-Premises Testing of any equipment, product or assembly is recommended by the product manufacturer or where specified as part of this section and/or any related specification section:
1. The Authority shall have the option of witnessing all factory tests. The Contractor shall notify the Authority at a minimum of thirty (30) working days prior to the performance of any factory or off-premises tests.
   a. Where the factory or assembly point for all off-premises testing is not within two (2) hours driving time from the project location, the contractor shall include as part of this project all per diem costs (travel, meals and lodging) for a minimum of two representatives from the Authority to witness all testing.
2. Provide four (4) copies of certified test reports containing all preliminary test data and testing procedures shall be furnished to the Authority prior to any final testing and not more than ninety (90) days after completion of any tests.
3. When equipment, product, or assembly fails to meet any factory or off-premises tests, retesting of equipment, product, or assembly shall be mandated, the manufacturer/contractor shall be liable for all additional expenses, including all expenses incurred by the Authority for witnessing the retesting of any equipment, product, or assembly.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate with all trades at the time of shop drawing submission detailing all space and/or room conditions. The contractor shall coordinate with the appropriate trade all conditions impacting the installation of any system including but not limited to all equipment locations, ceilings, lighting fixtures, fire protection piping, and ductwork layouts to the satisfaction of all concerned trades, subject to final review by the Authority.
1. Coordinate exact location of all desktop/counter mounted equipment with the Authority, as well as all affected trades and tenants prior to the installation of any equipment and/or cabling.

2. Coordinate exact location(s) of all ceiling mounted cable, conduits, equipment, and/or devices with all architectural plans, reflected ceiling plans and affected trades prior to installation.
3. Equipment installations requiring coordination with other trades the contractor shall provide all templates, backboxes and equipment anchor bolts for mounting or flush mounting preparation, (e.g. pedestals or other devices requiring mounting on walls, concrete pads or other materials). Coordinate delivery of templates and equipment anchor bolts to preclude any delay in the construction schedule or the work of the affected trade.
4. If installation of equipment, raceways, cable trays, J-hooks and/or conduit is performed prior to coordination with other trades, which interferes with work of other trades or operation and maintenance of the facility, make necessary changes to correct the condition at no additional cost to the Authority.
5. Contractor to provide all component MAC addresses to the Authority in device labeled floor plans and spreadsheet form for Authority network configuration.

B. Prior to final programming of all systems review with the Authority all system features, functions, system operations and related operational programming for all systems provided.

C. Provide coordination with all system sub-contractors and trades for the proper installation of all equipment, components, and all integration requirements in order to provide fully operational systems in accordance with all applicable specification sections.

D. Each Contractor shall maintain a complete set of current and up to date shop drawings and equipment submissions at the job site at all times. Shop drawings and all other submissions shall be made available to the Authority upon request.

E. Coordinate the work of this contract with the work of the Authority and all Authority Vendors. Schedule all work to ensure that the work of the Authority and all Authority Vendors can proceed in accordance with the Project Schedule.
1. All communications room spaces including, but not limited to IDF, MDF and control rooms spaces shall be constructed and complete ahead of final project completion in order to allow the Authority and Vendors to complete additional work within these spaces. Refer to Section 01 01 00 for early completion requirements. Completion shall, at a minimum, include the following elements:
   a. The room shall be secured in accordance with the approved Security Plan described in 1.8 Delivery, Storage and Handling.
   b. The following work items relating specifically to these spaces shall be completed as part of this requirement:
      1) Architectural finishes
      2) Secure doors
      3) Electrical Power
      4) Grounding and Bonding
      5) Mechanical Systems
      6) Fire Suppression

7) Equipment Racks and Cabinets including, but not limited to complete installation, bonding and labeling. All work within equipment racks and cabinets shall be complete including, but not limited to installation and labeling of patch panels, patch cables, wire management, surge protectors, and similar work.
8) Structured Cabling System Backbone Cabling including, but not limited to complete installation, termination, testing, and labeling of any cabling and pathways within, terminating, or routing through the space. Work shall also include all terminations, cross-connects, securing, and fiber channeling for a complete and operational backbone system.
9) Final Cleaning

c. Notify the Authority upon completion of each communications room space to obtain written acceptance. Rooms shall not be considered complete until final written acceptance is issued by the Authority.

3.2 EQUIPMENT PROTECTION

A. Protect all materials, equipment, devices, or components permanently installed and/or stored on the job site. Protect all materials, equipment, cabling, devices, or components during construction and after installation. Provide appropriate protection of all materials, equipment, components, and/or devices until time of substantial completion. All materials, equipment, components and/or devices shall be protected during shipment and storage against any physical damage, dirt, moisture, cold, snow, wind or rain:

1. During installation, enclosures, racks/cabinets, equipment, controls, controllers, circuit protective devices, and other like items, shall be protected against entry of any foreign matter; and shall be vacuum cleaned both inside and outside before testing and operating and repainting if required.
2. Any materials, equipment, components and/or devices, stored on site, which have been deemed by the Authority to exhibit any indications of damage or exposure dust or moisture shall not be installed and shall returned to the source of supply for immediate replacement.
   a. The use of spare parts or the return of defective equipment for repair to mitigate the damage of defective materials, equipment, components, and/or devices shall not be acceptable. All materials, equipment, components, and/or devices shall be new and unused until final acceptance by the Design Professional.
3. Provide and apply protective material immediately upon receiving the products and maintain throughout the construction process.
   a. Painted surfaces shall be protected with factory installed removable heavy craft paper, sheet vinyl or equal.
   b. Any damaged paint on equipment and materials shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired area is not obvious or detectable.

4. Failure to properly protect all materials, equipment, components and/or devices prior to final acceptance shall constitute sufficient cause for rejection of materials, equipment, components and/or devices should any defects, damage or degradation in performance is observed.

B. Seismic Performance: The Contractor shall furnish and install all equipment bracing, and anchoring rated for the seismic zone of the geographical area in which the project resides, and shall withstand the effects of earthquake motion and wind forces in accordance with the current editions of the IBC and ASCE/SEI 7. Refer to Refer to Division 01 and Division 26 – Hangers and Supports for additional seismic information and requirements.
   1. Equipment shall include, but not be limited to, racks/cabinets, video monitors, TV's, cable trays, conduits, junction boxes, and all associated appurtenances.

C. Immediately replace all malfunctioning materials, equipment, components, and/or devices with new unused products up until the time the Authority issues final acceptance of the system. The returning of any malfunctioning equipment, devices, and/or components to the manufacturer for repair and then reinstallation at the project site shall not be acceptable.
   1. All replacement materials, equipment, components, and/or devices shall be factory new and not obtained from the Project's spare parts inventory or use factory recycled products unless expressly identified by contractor prior to replacement and approved beforehand by the Authority.

3.3 WORK PERFORMANCE

A. Installation, final termination, testing, start-up and commissioning of all systems, system components and cabling infrastructures shall be under the direct supervision of the appropriate system contractor or sub-contractor. The sub-contractor shall be an accredited and authorized distributor of the appropriate equipment manufacturer and shall be fully certified in the installation, testing, commissioning, and programming of all equipment, devices, components, and/or systems being provided as part of this project.

B. Job site safety and worker safety is the responsibility of the Contractor. Ensure that safe access and egress from all work areas is maintained during movement and installation of materials. Clean up all debris generated by installation activities. Keep all communications equipment rooms free of debris at all times.

C. Pre-installation Conferences: Include provisions to attend all pre-installation conferences at Project site in compliance with all requirements in Division 01 Specification Section and as herein specified. Review methods and procedures related to installation and operations of all communications systems, including, but not limited to, the following:
   1. Inspect and discuss electrical and equipment roughing-in related to all communications systems as well as other preparatory work required to be performed by other trades.

2. Review and discuss all work, equipment deliveries, installation procedures, and related scopes as required to conform to the phased construction schedule.
3. Review sequence of operations for each type of system, control, cabling and/or integration to any systems and/or equipment provided by other trades.
4. Review and finalize construction schedule and verify availability of materials, installation personnel, equipment, and any preparatory work by other trades needed to make progress and avoid delays.
5. Review required start-up, testing, commissioning, and certifying procedures to be employed for each system and any impacts to other trades.

D. For work on existing facilities, arrange, phase, and perform work to assure the operation of all communications systems for other buildings and contiguous spaces at all times. Refer to Division 01 Specification Section for additional requirements.

E. All new work shall be installed and connected to existing work neatly and carefully. Disturbed or damaged work shall be replaced or repaired to its prior conditions, as required by Division 01 Specification Section.

F. Remove all unnecessary tools and equipment, unused materials, packing materials, and debris from each area where work has been completed unless designated for storage.

G. Coordinate the installation of all cabling, conduits/raceways and cable trays and equipment with applicable trades to ensure proper operation and function of all integrated systems in accordance with all related specification sections. Refer to Division 01 Specification Section for additional project coordination requirements.
1. Coordinate with all trades at the time of shop drawing submission detailing all space and/or room conditions. The contractor shall coordinate with the appropriate trade all conditions impacting the installation of any system, conduit, or cable tray including but not limited to all equipment locations, site conditions, ceilings, lighting fixtures, fire protection piping, and ductwork layouts to the satisfaction of all concerned trades, subject to final review by the Authority.
   a. Coordinate exact location of all desktop/counter/wall mounted equipment with the Authority and all affected trades prior to the installation of any equipment and/or cabling.
   b. Coordinate exact location(s) of all cable, conduits, equipment and/or devices installations with all architectural plans, site plans, reflected ceiling plans and affected trades prior to installation.
      1) Equipment installations requiring coordination with other trades the contractor shall provide all templates, back- boxes and equipment anchor bolts for mounting or flush mounting preparation, (e.g. pedestals or other devices requiring mounting on walls, concrete pads or other materials). Coordinate delivery of templates and equipment anchor bolts to preclude any delay in the construction schedule or the work of the affected trade.

c. If installation of equipment, devices, cabling, raceways, cable trays and/or conduit is performed prior to coordination with other trades, which interferes with work of other trades or operation and maintenance of the facility, make necessary changes to correct the condition at no additional cost to the Authority.

d. Prior to the final programming of any systems review with The Authority all system features, functions, system operations, network mapping, system integrated responses and all related programming as required for the proper operation of the respective communications systems.

H. The Contractor shall maintain a complete set of current and up to date set of shop drawings and equipment submissions at the job site at all times. The Shop drawings and all other submissions shall be marked up to reflect all as-built conditions and shall be made available for review by the Authority upon request.

I. The Contractor shall prepare the necessary documents required for installing, testing, and bringing each system online. Such documents include but are not limited to:

1. Project management and quality assurance plans
2. Testing plans
3. Component and system submittal documents
4. Installation plans
5. Component design plans
6. System user documentation
7. As-built drawings and documentation

J. The Contractor shall coordinate with the Authority to ensure each system meets the project requirements. The Contractor shall meet all applicable ADA requirements.

3.4 EQUIPMENT INSTALLATION

A. General

1. The Contractor shall provide all tools and test equipment required to install, verify, and test the installation and to determine that it meets the specifications. The Contractor shall furnish all necessary materials required to implement and to achieve the required work performance.
2. The Contractor shall install products detailed in the specifications, system requirements, drawings and Contractor designs including those purchased by the Contractor and those provided by other parties.
3. All equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the Specification shall be subject to the control and approval of the Authority.
4. All system equipment installations shall be in accordance with good engineering practices, NEC, local building codes, and all manufacturer's requirements. Cable terminations at all equipment locations shall comply with all state and local electrical codes. All wiring shall test free from all grounds, shorts, stray voltages, and EMI.

5. Follow manufacturers' instructions for installing, components and adjusting all equipment and cabling. Submit two (2) copies of such instructions to the Authority before installing any equipment. Provide an additional copy of such instructions at the equipment during any work on the equipment. Where no instructions are included with the equipment, follow accepted industry practices and workmanlike installation standards.
6. Equipment location shall be as close as practical to locations as indicated on the contract drawings.
    a. Provide all equipment clearances in accordance with NEC requirements. Arrange equipment to facilitate unrestricted access for maintenance and service around all equipment, components, and/or cable terminations.
7. Where the Authority determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the project.
    a. "Conveniently accessible" is defined as being capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as, but not limited to, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.
8. System/Hardware and mounting must comply with IBC Seismic Requirements.
9. Where undefined by codes and standards, Contractor shall apply a safety factor of at least 2 times the rated load to all fastenings and supports of system components.
10. For equipment mounted in drawers or on slides, provide the interconnecting cables with a service loop of not less than three feet and ensure that the cable is long enough to allow full extension of drawer or slide.
11. The Contractor's quality assurance Inspector shall conduct a visual inspection of all installations to verify that the installations are in accordance with the project’s and manufacturer's specifications. Records of the inspections signed and dated by the Quality Assurance Inspector shall be provided to the Authority. Prior to any scheduled inspections the Authority representative shall be notified by the Contractor of any inspection(s) so they may witness.

B. Software Installation
1. The Contractor shall test all custom and packaged “off-the-shelf” software in development, test, stage and production environments, and have successfully passed factory acceptance testing, prior to installation on-site.
2. Contractor shall install and configure all software in accordance with the software manufacturer's installation instructions. Apply the latest patches and security updates, unless otherwise noted.

C. Hardware Installation
1. Final hardware selected and installation of hardware shall be coordinated with the Contractor. Additionally, the Contractor shall ensure the ventilation requirements for the all hardware components are met.
2. The Contractor shall install and inspect all hardware required in this specification in accordance with the manufacturer's installation instructions. Final placement of hardware is subject to the Authority approval.

3. The Contractor shall be responsible for any and all loss or damage in the shipment and delivery of all material until transfer of title to the Authority.
4. The Contractor shall obtain written permission from the Authority before proceeding with any work which requires cutting into or through any part of the building structures such as, but not limited to, girders, beams, concrete, carpeted or tiled floors, partitions or ceilings. The Contractor shall obtain written permission from the Authority before cutting into or through any part of the building structures where fireproofing or moisture proofing could be impaired. In any such case the Contractor shall be responsible for restoring the affected area to "like-new" condition or to a condition to match the existing conditions.
5. The Contractor shall take all steps necessary to ensure that all public areas remain clear or are properly marked during installation or maintenance.
6. The Contractor shall coordinate installation with the Authority to minimize disruption of existing business functions at the airport.
7. The Contractor shall place materials only in those locations that have been previously approved. Any other locations shall be approved, in writing, by the Authority.
8. The Contractor shall label all cabling and patch cords in accordance with the Authority approved labeling plan. Coordination with the Authority shall be performed, and all labeling shall be approved, prior to implementation.

D. System Startup
1. The Contractor shall not apply power to the system until after:
   a. System and components have been installed and inspected in accordance with the manufacturer's installation instructions.
   b. A visual inspection of the system components has been conducted to ensure that defective equipment items have not been installed and that there are no loose connections.
   c. System wiring has been tested and verified as correctly connected as indicated.
   d. All system grounding and transient protection systems have been verified as properly installed and connected, as indicated.
   e. Power supplies to be connected to the system and equipment have been verified as the correct voltage, phasing, and frequency as indicated.
   f. Satisfaction of the above requirements shall not relieve the Contractor of responsibility for incorrect installations, defective equipment items, or collateral damage due to Contractor work/equipment.

3.5 COMMUNICATIONS CABLING REQUIREMENTS

A. All wiring and cables shall be properly dressed and/or bundled with hook-and-loop (Velcro) tie-wraps or cable ties. Twisted wire, tape, rope, twine, phone wire and similar bits of debris usually available on site are not acceptable substitutes for proper securing hardware. All inter-rack cables and wiring must be properly routed, and where available, in cable trays. Overhead cables must be easily removed or reworked within the cable trays. Proper care must be taken to ensure that new cables added to the trays are not stressed or intertwined with existing cables. Overhead cables may not cross perpendiculars or be suspended in mid-air without supports.

B. Cabling shall be sized to support the appropriate communication system. All communications cable installations shall be in accordance with good engineering practices as established by the EIA, IEEE and the NEC. All cabling shall meet all state and local electrical codes. All cabling shall test free from all grounds, shorts, and EMI.
   1. Contractors shall have the option to combine all cable home runs and conductors of same type and voltage "class" in accordance with NEC requirements unless specified elsewhere. Size all conduits and cable trays to meet the required fill ratios and install all conductors in accordance with NEC requirements and manufacturers recommendations.
      a. All communications cabling located above accessible suspended ceilings shall be installed in conduit.
      b. Cabling installed above hard ceiling spaces shall be installed in dedicated conduits.
      c. No exposed cabling will be acceptable in finished or occupied spaces of the facility without approval by the Authority.
      d. Any communications system cabling installed exterior to the building and/or all cabling being routed from the facility to any remote location external to the project location shall utilize OSP rated fiber optic cable installed in conduit system.
   2. Do not install bruised, kinked, scored, deformed, abraded, or otherwise damaged cable. Do not splice cable between indicated terminations, taps, or junction points. Remove and discard cable where damaged during installation and replace it with new cable.
   3. Ensure that all communications cabling supports (conduits, support grips, cable trays, and cable termination panels) are fully installed before proceeding with cable installation.
   4. At no time shall any cables be installed and left unsupported, nor shall cables be tie-wrapped to any other supporting structure in lieu of specified cable supports. Do not tie-wrap or permanently affix cable bundles to approved cable supports.
      a. NOTE: Cable bundles shall not be cinched too tightly; all cable ties shall be hook-and-loop ("Velcro") tie-wraps only.
   5. The Contractor shall not permit any communications cabling to lie unprotected on the floor at any time. If cables must be left on any floor, protect the cables so that they may not be walked on or have any material or equipment placed or rolled on top. Replace all damaged cables from demarcation to termination point; no splicing of damaged cables shall be permitted.

6. Maintain manufacturers recommended minimum bend radiuses of all cabling. Do not stretch, stress, tightly coil, bend, or crimp cables. The Contractor shall keep all cabling out of the way of other trades during staging of any work. The contractor at the contractor's expense will replace all severely stressed or damaged cables, equipment, and materials as determined by the Authority.
7. No media, fiber or copper, shall be installed in lengths surpassing Standards based length requirements.
8. Wire and cable routing shown on the Contract Drawings is approximate unless dimensioned. Route wire and cable as required to meet Project conditions.
9. Where wire and cable routing is not shown, and destination only is indicated, determine exact routing and lengths required. Record actual routing on as-built for all conduit larger than one inch.

C. Unshielded Twisted Pair (UTP) and Shielded Twisted Pair (STP) Cable
1. All TCP/IP-based copper network cabling shall be Category 6 or Category 6a rated as noted and installed in conduit except within dedicated communications rooms. All communications raceway shall not contain any AC carrying conductors or non-associated communications network cables.
2. Refer to related specification sections for additional requirements related to Category 6 or 6a cabling types, and testing requirements.
   a. All horizontal data drops shall be terminated on Category-6 or 6a patch panels installed on the 19" equipment racks\cabinets.
   b. All data drops and backbone cabling installed above inaccessible ceiling spaces or areas containing no ceiling shall be installed in dedicated conduits. In no case shall cable be supported on ceiling tiles, T-bars, or tie- wrapped to any conduit or pipes.
      a) Category-6 cables shall not be cinched too tightly; all cable bundles at patch panel locations and in the field shall be VELCRO type tie-wraps only. Plastic wire ties shall not be accepted on any Category-6 or 6a cabling.
      b) Each network drop shall be a dedicated Category-6 or 6a cable and shall not exceed a maximum distance of 295 feet from the associated communications room termination panel to the furthermost data port for that network drop.
      c) Cable Support: Mechanically secure to the permanent building structure where not installed in raceway. Provide "J" hooks at regular intervals no greater than 5' apart depended appropriate to the cable bundle and size.
      d) Communications drops installed inside walls shall be installed in dedicated conduit terminating in a junction box at the jack location.
      e) Cable and wiring shall not lay loose on ceiling tiles or grids. Cable must be supported in all areas. Bridle rings or tie-wrapped supporting methods are not acceptable. Independent dedicated support must be used between conduit stub-ups and cable trays.

f) Install all cabling parallel and perpendicular to building lines and follow building structure. Use cable support equipment/hardware recommended by the manufacturer and/or as herein specified.

g) Provide all terminations, cross-connects, wire management, surge protectors, etc. for a complete and operational system.

h) Any data communications system cabling installed exterior to the building and/or being routed from the facility to any remote location external to the project location shall be outside rated (OSP) category-6 or 6a cable.

c. Ensure that all communications systems cabling supports (conduits, support grips, cable trays, and termination patch panels) are fully installed before proceeding with cable installation.

D. Fiber Optic Cabling

1. All fiber optic cabling shall be provided to meet the communications requirements for all network communications systems, at the minimum all fiber optic cabling shall be sized in accordance with the project documents. All fiber optic cabling shall be a minimum of 8.3/125µm OS2 type cabling. Multi-mode fiber optic cabling shall be unacceptable, unless for specific uses explicitly defined in the contract documents.

a. All fiber optic cabling shall be a continuous segment from demarcation to termination point and shall be installed above accessible ceilings wherever possible. All fiber optic cabling shall be installed in dedicated conduits.

1) Installation of all fiber optic cabling shall be in accordance with all guidelines established by the product manufacturer and all referenced industry standards.

2) Special care shall be taken to avoid damage to the cable. While under pulling tension, the cable shall not be bent into a curve with a radius of less than twenty (20) times the cable diameter, or no less than manufacturers minimum.

3) Pulling tension shall not exceed manufacturer's recommended maximum tensile load. Contractor shall utilize a winch with tension control or a "break- away" link designed to break away at or below the recommended maximum pulling tension.

4) Use methods and lubricating compounds on cables and wires to prevent damage to material and products during roughing-in. Provide compounds that are not injurious to the cable and wire jackets that do not harden or become adhesive.

2. All exterior fiber optic cabling shall be rated for exterior outside plant (OSP) applications and installed in dedicated inner-duct conduit system, and routed in the exterior conduit ducts in accordance with the requirements of the contract documents. Outside plant cable not installed in conduit shall not extend more than fifty (50) feet into a building interior before terminating and transitioning to standard indoor fiber optic cable in accordance with the NEC.

3. Fiber optic cabling shall be provided as the primary media for any exterior network components installed remote to building, as well as all network communications links for all backbone communications.
   a. The contractor shall be responsible for the determination of actual segment lengths. Actual quantities will be calculated by the routing as indicated on the contract drawings and/or in the field based on existing conditions.
4. All splices shall be fusion type. Mechanical splices shall not be acceptable.
5. Refer to related specification sections for additional requirements related to fiber optic cabling types, sizes and testing requirements.

E. Hybrid (Conductive) Fiber Optic Cable
1. Provide fiber optic cable with integrated copper conductors for electrical power distribution where indicated on the Contract Drawings. Fiber optic cabling shall meet all of the requirements listed under "Fiber Optic Cabling" above.

F. Non-Twisted Pair Copper Cable Terminations
1. Splice, Taps and Terminations of all non-twisted pair copper cabling: Use numbered terminal strips in junction, pull and outlet boxes, terminal cabinets, and equipment enclosures. Tighten connections to comply with tightening torques specified in UL Standard 486A.
2. Tighten connectors and terminals, including screws and bolts, in accordance with equipment manufacturers published torque-tightening values for equipment connectors.
3. Rack and terminal cabinet wiring shall be neatly routed or bundled and routed along rack sides. All splices and connections shall be by plug, solder or screw terminal strips, etc. Splices shall not hang in racks or terminal cabinets.

G. Conduits/Raceway/Cable Trays
1. Provide conduit and raceway systems for all communications networks as indicated below. Refer to all related specification sections for additional conduit and raceway information.
   a. Accessible suspended ceilings: Provide conduit stub-up from each outlet location to space above ceiling. All conduit stub-up shall include nylon bushing at exposed edge of conduit for protection of all cabling
   b. Exposed structure: Provide conduit run from each drop to a height of 12 feet to cable tray or j-hooks where provided.
   c. Vertical Wire runway shall be installed in dedicated conduits and shall be supported any /all risers between floors in closets or accessible locations; in no case shall any cable risers be unsupported.
   d. Cables entering all communications equipment rooms shall be supported with Cable tray from entrance to rack/cabinet location as indicated on the contract drawings and/or herein specified.
   e. Wire basket cable tray system shall be provided in all corridors as indicated on the contract drawings and installed as herein specified.

2. All conduits/raceways shall be concealed and shall be installed above accessible finished ceilings and/or in walls. Any conduits/raceways installed in areas requiring installation to be exposed, shall be installed as tight as possible to ceilings and at right angles to walls/building lines and shall not obstruct any access hatches, equipment service panels, lighting or other equipment and/or devices. No exposed conduits/raceways shall be installed without prior approval of the Authority.
    a. Where conduits cannot be concealed above ceilings or in walls and must be installed in finished or occupied areas of the building, all conduits shall be finished wire-mold type raceways or approved equal. Finished wire-mold type raceways shall not be installed without prior approval in writing by the Authority.
    b. Where any equipment and/or junction boxes are installed above non-accessible finished ceilings, the contractor shall provide access hatches listed for the intended application. Access hatches shall be located so that service access to the equipment and/or junction boxes is unimpeded.
        1) Access hatches shall not obstruct any equipment, service panels, lighting equipment, devices, or any architectural elements of the ceiling. At the time of submittals, the contractor shall submit all proposed access hatch locations for review by the Design Professional.
    c. All conduits/raceways shall be supported in accordance with NEC requirements and shall be affixed in such a manner that tampering and/or removal without the use of specialized tools shall be prevented.
    d. All conduits/raceways shall be installed in a manner that prevents tampering or removal when installed in areas exposed to the general population.
        1) Provide tamper-resistant installation utilizing "torx with peg" security-fastening devices for all conduits/raceways, equipment, devices and appurtenances in all areas accessible to the general population and/or areas subjected to tampering or vandalism.
    e. Interior raceways shall be a minimum 1 inch unless otherwise noted. Exterior raceways shall be a minimum 1 1/4-inch. Size all raceways and install conductors in accordance with NEC requirements. Fill ratio shall not exceed 40 percent for indoor raceways or exterior raceways.
        1) EMT conduit with compression fittings and/or MC cabling may be utilized in all inaccessible ceiling areas unless otherwise restricted by code.
        2) Threaded Rigid metal conduit shall be used on all exterior applications, stub-ups and all interior areas where concealed conduit requirements cannot be met and are exposed to tampering or damage by the general population.
            a) All areas considered being of high risk due to the nature of the occupancy or the need to protect and maintain the integrity of the cabling shall be installed in rigid threaded conduits.

f. Conduit expansion couplings shall be furnished and installed in all areas where expansion/contraction of structure may occur in order to couple two sections of a conduit runs to support longitudinal movement. The contractor shall refer to architectural drawings for exact locations of all building expansion joints.
   1) Conduit expansion couplings shall be consistent with the size the conduit being installed, shall be steel electrogalvanized, and shall meet all environmental and seismic conditions.
   2) Expansion couplings shall be weatherproof and approved for use indoors or outdoors without an external bonding jumper.
   3) Expansion couplings shall be UL Listed and approved for use in wet locations.
   4) Expansion couplings shall comply with UL 514B, CSA 22.2 No. 18 3-12, NEMA FB1.

g. Exterior raceways: PVC schedule 40 conduit at the minimum shall be utilized in all underground applications unless otherwise specified by related specification sections. The conduit shall be buried below the local frost line, but not less than 36" below grade. Warning flagging tape shall be buried 12" below grade to indicate the conduit routing location. Refer to related specification sections for additional requirements.
   1) All exterior conduits larger than 2" in diameter shall be provided with dedicated inner-duct conduit systems, segregated by network type (i.e. security, etc.) and shall include a minimum of one spare empty inner-duct per conduit.
   2) The Contractor shall have the option to utilize the same trench/routing location as other utilities. In no case shall any system conduits or duct banks be combined with other electrical utilities without providing the required separation between conduits as necessary to ensure the minimal transmission or conduction of any RF and/or EMI signals.

h. Outlet Boxes: shall be 4 x 4 x 2-1/8 inches deep with single gang reducer plate where required for all data outlet locations and single gang for wall mounted telephone locations.
   1) All outlet boxes shall be provided with single or dual gang device mud-rings flush to finished wall as required based on type and configuration of outlet and type of wall construction.
   2) Use deep masonry boxes at masonry construction. T-Bar hangers or other appropriate mounting hardware shall be utilized to support boxes mounted in the ceiling.

3. Cable Tray – Ladder Type: Provide cable trays in all communications rooms and closets for routing horizontal distribution and backbone communications cables. All cable trays shall be constructed of aluminum with two side rails and 9" rung spacing. Cable tray shall be complete will all materials, miscellaneous hardware and all appurtenances required for a complete cable distribution and support system.

a. All cable tray widths shall be sized according to the total number of cables to be supported within the various trays plus an additional 100% spare capacity for future expansion capability. At the minimum all cable trays installed in communications rooms and closets shall be a minimum of 24" wide by 4" deep, unless otherwise noted.

b. Install cable tray in a manner ensuring that all circuits fully comply with all ANSI/TIA/EIA standards.
   1) Maintain a minimum clearance of 24" between top of cable tray and ceiling structure or other equipment or raceway.
   2) Maintain a minimum clearance of 12" between bottom of cable tray and top ceiling grid or other equipment or raceway.
   3) Maintain a minimum clearance of 24" from all conduits or cables used for electrical power distribution.
   4) Maintain a minimum clearance of 12" between bottom of cable tray and top of equipment racks and/or cabinets
   5) Maintain a minimum clearance of 24" from fluorescent lighting. All Pathways shall cross perpendicular to fluorescent lighting and electrical power cables or conduits.
   6) Cable tray supports shall be attached to the structural ceiling or walls with hardware or other installation and support aids specifically designed for the cable tray and designed to support the cable tray's weight and required cable weight and volume.
   7) Do not attach cable tray supports to ceiling support system or other mechanical support systems.
   8) Load span criteria: Install tray supports in accordance with the load criteria of L/240.
   9) Cable Trays shall be supported at 6-foot intervals.
   10) All Cable trays shall be installed without burrs, sharp edges, or projections, which may damage cable insulation.
   11) All lengths or sections of cable tray shall be bonded and grounded in accordance with NEC, EIA/TIA, IEEE.

c. Follow manufacturers' instructions for installing, components and adjusting all equipment and cabling. Submit two (2) copies of such instructions to the Architect before installing any equipment. Provide a copy of such instructions at the equipment during any work on the equipment. Where no instructions are included with the equipment, follow accepted industry practices and workmanlike installation standards.

4. Cable Tray - Basket Type

a. Acceptable Manufacturers: subject to compliance with these specifications, wire cable trays and support systems as manufactured by:
   1) GS Metal Flex Tray series
   2) Triangle Electrical Products. Co.
   3) Eaton (formerly Cooper) B – Line Systems

b. General

1) Provide wire cable tray where indicated by the contract documents; the contractor shall include all required types, sizes, necessary connector assemblies, clamp assemblies, connector plates, splice plates and splice bars. Construct units with rounded edges and smooth surfaces; in compliance with applicable standards; and with the following additional construction features.

c. Materials and Finishes specifications for each wire cable tray as follows:
   1) Electroplated Zinc: Straight sections shall be made from steel meeting the minimum mechanical properties of ASTM A510 and shall be electro-plated zinc in accordance with ASTM B633 SC2.
   2) Stainless Steel: Straight sections and accessories shall be made from AISI Type 304 Stainless Steel.
   3) Paint: Straight sections shall be painted "Computer White" over Electrodeposited Zinc.
   4) Pre-Galvanized Zinc: Wall brackets and other pre-galvanized accessories shall be coated with zinc in accordance with ASTM A653.
   5) Electro-Galvanized Zinc: Support accessories and miscellaneous hardware shall be coated in accordance with ASTM B633 SC3. All threaded components shall be coated in accordance with ASTM B633

d. Cable Tray Support System
   1) All straight section longitudinal wires shall be straight (with no bends).
   2) Wire cable tray shall be made of high strength steel wires and formed into standard 2 inch by 4-inch wire mesh pattern with intersecting wires welded together. All wire ends along wire cable tray sides (flanges) shall be rounded during manufacturing for safety of cables and installers.
   3) Wire cable tray sizes shall conform to the following nominal criteria:
      a) Straight sections shall be furnished in standard 120-inch lengths.
   4) Wire basket shall have at the minimum 4-inch usable loading depth by 16 inches wide.
      a) All fittings shall be field formed as needed.
      b) All splicing assemblies shall be the bolted type using serrated flange locknuts. Hardware shall be either yellow zinc dichromate in accordance with ASTM B633 SC2 or AISI Type 304 Stainless Steel.
      c) Wire basket supports shall be center support hangers, trapeze hangers or wall brackets as manufactured by Cooper B-Line, Inc. or Architect approved equal.
      d) Trapeze hangers or center support hangers shall be supported by 1/4 inch or 3/8-inch diameter rods.
      e) Special accessories shall be furnished as required to protect, support, and install a wire basket support system.
   5) Installation

a) Install wire cable tray where indicated on the contract drawings in accordance with manufacturers requirements and recognized industry practices (NEMA VE-2 2000). Ensure that the cable tray equipment complies with requirements of NEC, and applicable portions of NFPA 70 and NECA's "Standards of Installation" pertaining to general Electrical installation practices.

b) Coordinate wire cable tray with other electrical work as necessary to properly interface installation of cable tray with other trades.

c) Provide sufficient space encompassing cable tray to permit access for installing and maintaining cables. Provide a minimum clearance of at least 6" clear AFC and 12" clear above cable tray.

H. Penetrations of Walls and Floors:

1. All wall/floor penetrations are to be sleeved and fire stopped with approved fire stopping material or sealant as applicable for the type of penetration. Coordinate all cable and conduit penetrations of building with all affected trades. Refer to all related specification sections for additional wall/floor penetration requirements.

a. All penetrations of rated walls and floors shall be fire stopped in accordance with the ASTM and NFPA standards. Refer to related specification sections for additional requirements.

b. Floor penetrations shall be sleeved with a minimum sleeve diameter of 4 inches. An additional penetration shall be provided for future use, sleeved, and capped and fire stopped as required.

c. Coordinate size of wall penetration with conduit size, number of conductors. Comply with all NEC requirements.

d. The fire rating of all penetrated walls, floors, and ceiling structures shall be strictly maintained. All penetrations shall be fire-stopped and sealed by the Contractor.

e. Install fire-stopping in open penetrations and in the annular space of penetrations for fire rated barriers.

f. Installation of fire-stops shall be performed by an applicator/installer qualified and trained by the manufacturer. Installation shall be performed in strict accordance with manufacturer's detailed installation procedures.

g. Installation of all fire-stopping shall be in accordance with fire test reports, fire resistance requirements, acceptable sample installations, manufacturer's recommendations, local fire and building authorities, and applicable codes and shall be installed in a manner acceptable to the authority having jurisdiction.

3.6 ELECTRICAL POWER DISTRIBUTION

A. Refer to Division 26 specifications in addition to the following:

1. Primary power for all system controls, sub-control panels, processors, and power supplies shall be configured to switch to emergency backup power sources automatically when primary power is interrupted without degradation of any critical system functions.
2. All electrical power shall be hardwired to the panel. System components or panels employing the use of plug-in transformers, extension cords or cheater cords for the connection to electrical power shall not be acceptable.
3. Each equipment cabinet in all telecom equipment rooms shall be serviced by an L6-30 twist-lock receptacle. This receptacle will serve to connect to a rack-mount power distribution unit (PDU). This PDU will supply power to all equipment within the cabinet with 5R-20 receptacles.
4. Communications rooms shall require primary and secondary power sources to maintain functionality of security, life safety and selected IT systems in the event of a power failure. Uninterruptible power supplies (UPS) will be provided to provide "ride-through" power until the secondary power source comes online during an outage.

3.7 TRANSIENT VOLTAGE SUPPRESSION

A. Transient Voltage Surge Suppression: All cables and conductors extending beyond building façade (except nonconductive fiber optic cables) which serve as communications, control, or signaling circuits shall be protected against Transient Voltage surges and have Transient Voltage Surge Suppression (TVSS) protection.
   1. The TVSS device shall be UL listed in accordance with Standard TIA 497B installed at each end. Lighting and surge suppression shall be a multi-strike variety and include a fault indicator.
   2. Protection shall be furnished at the equipment and additional triple solid state surge protectors rated for the application on each wire line circuit shall be installed within 914.4 mm (3 ft) of the building cable entrance. Fuses shall not be acceptable for surge protection applications. All inputs and outputs shall be tested in both normal mode and common mode to verify there is no interference at the minimum surge suppression test shall meet the following criteria.
      a. All system power supplies serving exterior system components or devices shall be provided with the appropriate transient surge suppression protection on both the line side as well as the load side.
         1) A 10-microsecond rise time by 1000 microsecond pulse width waveform with a peak voltage of 1500 volts and a peak current of 60 amperes shall be the minimum performance requirements. Provide surge suppression in accordance with all manufacturer's requirements.
         2) An 8-microsecond rise time by 20-microsecond pulse width waveform with a peak voltage of 1000 volts and a peak current of 500 amperes shall be the minimum performance requirements. Provide surge suppression in accordance with all manufacturer's requirements.

3) Maximum series current: 2 AMPS. Provide units manufactured by Advanced Protection Technologies, model # TE/FA 10B or TE/FA 20B or approved equal.
4) Operating Temperature and Humidity: -40 to 85 degrees C (-40 to 185 degrees) shall be the minimum performance requirements. Provide surge suppression in accordance with all manufacturer's requirements.

3.8 GROUNDING AND BONDING

A. All electronic equipment, conduits, cable trays, racks/cabinets and cable shields shall be properly grounded and bonded in accordance with all requirements of ANSI/TIA 607-A, NEC 250 and IEEE 1100. Additionally, all communications room, IDF, and MDF room grounding and bonding shall be in accordance with all related specification sections and Motorola R56 Standards and Guidelines for Communications Sites (where Motorola radio equipment is installed).

1. A Telecommunications Grounding System shall be installed in all communications equipment rooms. Grounding system shall provide equalization of the grounding potentials between the building power system and the telecommunications main grounding bus-bar (TMGB) as well as all telecommunications grounding bus-bars (TGB). Grounding bus-bar shall provide the diversion of electrical transients from the telecommunications cables and to provide a safety ground for all equipment racks/cabinets, conduits, cable trays and cable shields as well as providing the required coupling to cancel and/or reduce transients.
   a. The TMGB and each TGB shall be provided where indicated on the drawings and shall provide an effective bonding connection to the nearest approved building grounding electrode (e.g., structural steel) as well as to the local power distribution panel grounding system (e.g., ac branch circuit panel board's equipment grounding busbar).
      1) The minimum bonding shall be #6 AWG copper conductor connected to the TMGB and all TGB's. Connections shall be 2-hole NEMA type compression or exothermic welded connections.
2. All grounding connections shall provide the equalization of all grounding potentials between the building power system and the grounding terminations at the communications equipment in order to provide the diversion of electrical transients as well as providing the necessary coupling in order to cancel and/or reduce any voltage transients.
   a. Equipment Grounding: Metallic structures, equipment racks, cabinets and enclosures as well as all raceways, cable trays, junction boxes, outlet boxes, machine frames, and other conductive items shall be bonded and grounded.

b. Duct Banks and Manholes: Provide an insulated equipment grounding conductor in each duct containing any voltage conductors, sized per NEC except that minimum size shall be No. 2 AWG. Bond the equipment grounding conductors to the grounding bus, to all manhole hardware and ground rods, to the cable shielding grounding provisions for all cable splices, terminations and equipment enclosures.

c. Metallic Fences equipped with communications equipment: Fences shall be grounded with a ground rod at each fixed gate post and at each corner post.

1) Drive ground rods until the top is 300 mm (12 inches) below grade. Attach a No. 4 AWG copper conductor, by exothermic weld to the ground rods and extend underground to the immediate vicinity of fence post. Lace the conductor vertically into 300 mm (12 inches) of fence mesh and fasten by two approved bronze compression fittings, one to bond wire to post and the other to bond wire to fence.

2) Each gate section shall be bonded to its gatepost by a 3 by 25 mm (1/8 by one inch) flexible braided copper strap and ground post clamps. Clamps shall be of the anti- electrolysis type.

3. All connections of grounding conductors to ground rods, bus bars, rebar, structural members, pipes and fences, as well as splices of any ground conductors, shall be made by exothermic welds except where otherwise noted. All connections to bar lugs shall be exothermic weld or compression type connections. Bolted type connection of ground conductors may only be made where terminal lugs or blocks have been furnished and installed in equipment by the manufacturer.

a. Equipment grounding conductors shall be insulated stranded copper, except for sizes No. 10 AWG and smaller shall be solid copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes No. 4 AWG and larger shall be permitted to be identified per the NEC.

1) At the minimum bonding connection shall be a #6 AWG copper conductor. All grounding shall provide an effective bonding connection between the protected equipment to the nearest approved building grounding electrode (structural steel) as well as to the local power distribution panel grounding system (e.g., ac branch circuit panel board’s equipment grounding busbar). All bonding and grounding connections shall be NEMA type compression or exothermic welded connections.

4. Refer to related specification sections for any additional grounding and bonding requirements.

3.9 EQUIPMENT IDENTIFICATION

A. Identify all system control, component and equipment cabinets using plastic laminate engraved (“lamicoid”) labels or approved equal. Firmly affix to the panel, device, and/or component. Refer to all related specification sections for additional requirements.

1. Nameplates shall be laminated black phenolic resin with a white core with engraved lettering, a minimum of 6 mm (1/4 inch) high. Secure nameplates with screws. Nameplates that are furnished by manufacturer as a standard catalog item or where other method of identification is herein specified. Dymo or Kroy tape adhesive-backed lettering shall not be acceptable.
2. Color-code all junction boxes and enclosures per NEC recommendations and Authority requirements. At the minimum provide all communications junction boxes as follows:
    a. Letter all pull boxes and junction boxes located in service areas, tunnels, above accessible ceilings and pipe chases with laminated black phenolic resin with a white core with engraved lettering, a minimum of 6 mm (1/4 inch) high. Secure nameplates with screws.
3. Permanently label all cabling at both ends with self-adhering plastic labels.
    a. Labeling: hand written labels are not acceptable. All labels shall be machine printed on clear or opaque tape, stenciled onto adhesive labels, or type written onto adhesive labels. The font shall be at least one-eighth inch (1/8") in height, block characters, and legible.
        1) The text shall be of a color contrasting with the label such that it may be easily read. If labeling tape is utilized, the width of the tape shall not exceed 3/8," and the font color shall contrast with the background.
        2) All data patch panels shall exhibit data drop numbers, in sequential order, for all workstations served by the associated network equipment.
        3) Each fiber optic cable segment shall be labeled at each end with its respective communications network identifier.
        4) Warning Tags: At each location where the fiber cable is exposed to human intrusion, it shall be marked with warning tags. These tags shall be yellow or orange in color, and shall contain the warning: "CAUTION FIBER OPTIC CABLE." The text shall be permanent, black, block characters, and at least 3/16" high.
            a) A warning tag shall be permanently affixed to each exposed cable or bundle of cables, at intervals of not more than five (5) feet. Any section of exposed cable which is less than five (5) feet in length shall have at least one warning tag affixed to it.
4. Provide typewritten circuit directories installed in 3-ring binders with transparent page protectors in each control and sub control cabinet and/or equipment rack.

3.10 MAINTENANCE & SERVICE

A. General Requirements
1. The Contractor shall provide all services required and equipment necessary to maintain all communications systems associated with this project in fully operational state as specified after formal written acceptance of the system.

a. Provide all necessary material required for performing scheduled adjustments or other non-scheduled work. Impacts on facility operations shall be minimized when performing scheduled adjustments or other non-scheduled work. Refer to Division 01 specification section for additional requirements.

b. The adjustment and repair of the communications systems shall include all software and firmware updates on all computers, servers, CPUs, terminals, devices, communications and data transmission media (DTM), facility interface processors, signal transmission equipment and processors.

c. Test, inspect, and service each system on a quarterly basis (three month intervals) during the warranty period from the time of final acceptance. The contractor shall compare quarterly test results with the test results at the time of final acceptance.

1) The contractor shall include as part of the quarterly test the calibration and/or adjustment of any device, component, and/or system that has deviated from the original test results at the time of final acceptance.

d. For each quarterly maintenance period, provide written notification to the Authority of the systems condition before and after service, the exact components that were tested and serviced, and overall status of the system.

B. Personnel

1. Service personnel shall be manufacturer certified in the maintenance, testing, and repair of the type of system and equipment provided for the project. Provide the Authority the name of the designated service representative, and of any change in personnel.

a. The Authority shall be provided copies of system manufacturer certifications for all designated service representatives.

2. Schedule of all work to be performed during regular working hours, Monday through Friday, excluding federal holidays.

C. Emergency Service

1. The Authority shall initiate service calls whenever the system is not functioning properly. The Contractor shall provide the Authority with an emergency service center telephone number. The emergency service center shall be staffed 24 hours a day 365 days a year. The Authority shall have sole Authority for determining catastrophic and non-catastrophic system failures.

a. For catastrophic system failures, the Contractor shall provide same day eight (8) hour service response with a defect correction time not to exceed sixteen (16) hours from arrival on site. Catastrophic system failures are defined as any system failure that the Authority determines will place the facility(s) at increased risk.

b. For non-catastrophic failures, the Contractor within 1 business day with a defect correction time not to exceed 48 hours from time of notification.

D. Records & Logs

1. The Contractor shall maintain records and logs of each task and organize cumulative records for each component and for the complete system chronologically. A continuous log shall be submitted for all devices. The log shall contain all initial settings, calibration, repair, and programming data. Complete logs shall be maintained and available for inspection on site, demonstrating planned and systematic adjustments and repairs have been accomplished for the system.

E. Work Request
1. The Contractor shall separately record each service call request, as received. The record shall include the serial number identifying the component involved, its location, date and time the call was received, specific nature of trouble, names of service personnel assigned to the task, instructions describing the action taken, the amount and nature of the materials used, and the date and time of commencement and completion.
2. The Contractor shall deliver a record of the work performed within five (5) working days after the work was completed.

F. System Modifications
1. The Contractor shall make any recommendations for system modification in writing to the Authority. No system modifications, including operating parameters and control settings, shall be made without prior written approval from the Authority. Any modifications made to the system shall be incorporated into the operation and maintenance manuals and all related documentation.

3.11 WARRANTY

A. Warrant material and workmanship for a period as specified in Division 01 of the contract documents and all related specification sections. The warranty period shall commence from the date the Contactor received written notification of final acceptance from the Authority. At the minimum the contractor shall provide warranty provisions:
1. Warrant the replacement of defective components/materials and/or correct defective work when given notice by the Authority during the warranty period.
a. At no time is the contractor to use the extra materials provided under the scope of this project to replace malfunctioning or damaged equipment and or components. The Contractor shall replace all malfunctioning or damaged equipment and or components with new. The repair and then reinstallation of malfunctioning or damaged equipment shall not be acceptable.

b. During the Warranty period, replace failed equipment per the terms specified in this section. As such, the Authority shall not be bound to the terms and conditions of the manufacturer's warranty, pertaining to the replacement of failed equipment. In any situation, it is the Contractor/Vendor's responsibility to keep the system operational during any hardware or software failures. Replacement equipment shall be provided to maintain operations while equipment manufacturer addresses warranty issues.
   1) Warranty replacements and repairs shall include any necessary shipping, handling and materials.

c. Establish a single point of contact for the Authority and provide any coordination responsibilities with manufacturers, suppliers, or contractors to resolve warranted issues and on all maintenance and service actions related to items included in the Warranty. Process and procedures for engaging technical support shall be developed and communicated to the Authority, Vendor.

2. Warranty excludes liability for consequential incidental, or special damages due to vandalism, misuse, or acts of god.
3. Onsite warranty response time by qualified technician shall be no more than 8 hours upon receipt of request from Authority, unless otherwise noted in related Division 27 specification sections.
4. Warranty repairs shall be provided to the Authority at no cost. This shall include but not limited to replacement of all defective components/materials, all labor charges, all travel costs and all vehicle charges.
5. Response time shall be 7 days a week / 24 hours a day / 365 days a Year.
6. Provide test, inspection, and service of each system on a semi-annual basis at six month intervals.
7. Contractor must provide verification that they maintain their principle base of operation along with the personnel that will be responsible for providing service within 3 hours driving time to the project site. This tenet of the warranty shall remain in effect for the life of the warranty.
8. All TCP/IP-based communications systems cabling and related appurtenances shall be provided with the manufacturer's 25-year extended warranty in addition to all requirements above.

B. The Contractor shall, as a condition of final payment, execute a written warranty certifying all contract requirements have been completed in accordance with all requirements of the Contract Documents.
   1. All system testing, commissioning, demonstration and training shall be performed prior to final system acceptance. All defects or damages due to faulty materials or workmanship shall be replaced without delay, to the satisfaction of the Authority's Representative, at the Contractor's expense.
      a. The contractor shall provide written documentation of test results and stating what was done to correct any deficiencies. The first inspection shall occur 90 calendar days after the acceptance date. The last inspection shall occur 30 calendar days prior to the end of the warranty.

b. The warranty period shall be extended until the last inspection and associated corrective actions are complete. Where any equipment and/or labor covered by Contractor's or manufacturer's warranty, has been replaced, due to failure, the warranty period for any replaced equipment or restored work shall be reinstated for a period equal to the original warranty period, and commencing with the date of completion of the replacement or restoration work.

2. In the event any manufacturer customarily provides a warranty period greater than one (1) year, the Contractor's warranty shall be for the same duration for that component.

3.12 FIELD SERVICES

A. In addition to all testing requirements as specified by Division 01 specification section and all related Division 27 Specification Section, testing of all systems, sub-systems and cabling infrastructures shall be provided in accordance with all requirements of this section.

B. Notify the Authority in writing, prior to the closing of any ceilings and ten (10) days advance of testing all system cabling to prevent delays in construction schedules.

C. Test all cabling to confirm that no grounds, shorts, sneak currents, RFI and EMI conditions exist prior to start-up and commissioning of all, components, devices, equipment and/or systems.

D. Before requesting a final inspection, the contractor shall perform a series of end to end installation performance tests. The contractor shall submit for approval by the Authority all test procedures to be employed, test result forms, and timetable for testing all fiber optic and UTP structured copper wiring.

E. Acceptance of the simple test procedures discussed below is predicated on the contractor's use of the specified products including but not limited to, all Division 27 systems, sub-systems, system components, fiber optic cable, category structured cable, cross-connect blocks, patch panels, and outlet devices as specified by all related specification sections and installed in accordance the Contract documents, manufacturer's recommended practices and all applicable codes, standards and industry practices. Acceptance of the completed installation for each system will be evaluated in the context of each of these factors.

F. Testing Requirements
1. Phases of Testing:
   a. Factory Acceptance Test (FAT) / Manufacturer's Proof of Concept Test (as applicable)
   b. On-Site Performance Verification Testing
   c. On-Site Endurance Testing

2. Test Plan/Procedure: The Contractor shall provide six (6) hardcopies and an electronic copy of the test plan/procedures for each testing phase for the review and approval of the Authority. The test plan for each phase shall detail the objectives of all tests. The tests shall clearly demonstrate that the system and its components fully comply with the requirements specified herein. The test plan shall be provided at least forty-five (45) days prior to the scheduled start of each test. Test plans shall contain at a minimum:
   a. Functional procedures including use of any test equipment
   b. Test equipment is to be identified by manufacturer and model
   c. Interconnection of test equipment and steps of operation shall be defined
   d. Test records shall include test equipment serial number, calibration date and calibration certification of test equipment
   e. Expected results required to comply with specifications
   f. Traceability matrix referencing specification requirements with specific test procedures
   g. Record of test results with witness initials or signature and date performed
   h. Pass or fail evaluation with comments.
   i. The test procedures shall provide conformity to all specification requirements. Satisfactory completion of the test procedure is necessary as a condition of system acceptance.
   j. The Contractor's Quality Assurance organization shall review all formal test procedures prepared by the Contractor and deliverable under the contract to assure the tests cover all requirements and that there is a conformity between the conducted test, the test results and specification requirements.
   k. Documentation verification, both interconnects and functionality shall be part of the test. Where documentation is not in accordance with the installed system interconnect and operating procedures, the system shall not be considered accepted until the system and documentation correlate.
   l. All testing must be witnessed by the Authority. The Contractor shall cooperate fully in this regard.
3. Test Reports: The Contractor shall prepare, for each test, a test report document that shall certify successful completion of that test. Six (6) hardcopies and one electronic version of the test report shall be submitted to the Authority for review and acceptance within seven (7) days following each test. The test report shall contain, at a minimum:
   1) Commentary on test results.
   2) A listing and discussion of all discrepancies between expected and actual results and of all failures encountered during the test and their resolution.
   3) Complete copy of test procedures and test data sheets with annotations showing dates, times, initials, and any other annotations entered during execution of the test.
   4) Signatures of persons who performed and witnessed the test.

4. Test Resolution: Any discrepancies or problems discovered during these tests shall be corrected by the Contractor at no cost to the Authority. The problems identified in each phase shall be corrected and the percentage of the entire system re-tested determined by the Authority, before any subsequent testing phase is performed.

G. Factory Acceptance Testing
1. Test Setup Equipment: Equipment shall be actual products or identical models of products to those designated to be delivered and installed at the site. The following equipment shall be setup and used for conducting pre-delivery test:
   a. Operator equipment associated with system.
   b. End devices and displays associated with system.
   c. Software associated with system.
   d. Administrative console equipment.
   e. Sufficient signal transmission media (STM) and associated equipment and accessories to provide a fully integrated system model. Include at least one of each type STM circuit.
   f. Number of field processors required for system to be installed at site.
   g. Enough load and data simulators to provide simulation of full load operational conditions as required by design. Loads shall be manually or software generated.
2. Preparation: Ensure that development of system is complete, required approvals of submittals have been obtained, and sufficient equipment procured to completely demonstrate and test system. Schedule pre-delivery test with Contractor at least 45 days prior to test:
3. Time: Prior to delivery of any equipment to site. Conduct on weekdays during standard business working hours.
4. Location: Manufacturer's plant or other location approved by the Authority.
5. Items to be tested shall be set up and performance verified prior to arrival of the Authority at test site.
6. Test: The purpose is to test the complete computer software package and equipment of the system and demonstrate that all specified features and performance criteria are met. All requirements of the specification shall be tested including, but not limited to:
   a. Functionality including reporting and response.
   b. System capacity.
   c. Hardware interaction.
   d. Hardware and software interaction.
   e. Demonstrate report generation.
7. Acceptance: Acceptance of system to perform sufficiently and provide specified functions shall be determined by the Authority witnessing the factory acceptance test. In addition to the Authority, testing shall be witnessed by up to two (2) additional Owners Authorized Representatives (OAR).
   a. Acceptance Criteria: Performance of system shall equal or exceed criteria stated in individual specification sections.

b. If system does not perform satisfactorily, the Contractor shall make corrections and modifications and schedule new test with the Authority. Compliance is at the sole discretion of the Authority. If compliance cannot be met, or is insufficient, the Authority shall have the right to terminate the contract.

8. Completion:
   a. At successful completion of test, dismantle equipment so as to prevent damage. Replace all defective or worn items.
   b. Re-pack in original containers all equipment to be delivered to site for installation. Mark on containers that items were used in factory test.
9. Reporting:
   a. Record all test procedures and results.
   b. Submit report in accordance with reporting requirements in General Testing Requirements Section.

H. Performance Verification Testing
1. Complete operational testing of all components and systems shall be witnessed by the Authority.
2. Schedule test with the Authority. Do not begin testing until:
   a. All systems have been installed and individually and jointly tested to ensure they are operating properly.
   b. Written permission from the Authority has been received.
3. Testing: As part of performance verification, test all components of system. The tests shall demonstrate system features.
4. Verification: Verify correct operation of the required system functionality as defined in these specifications.
5. Adjustment, Correction, and Completion:
   a. Correct deficiencies and retest affected components.
   b. Make necessary adjustments and modification to system after obtaining approval of the Authority.
   c. Completion: Performance verification test shall be complete when testing or retesting of each component has produced a positive result and has been approved in writing by the Authority.
6. Recording:
   a. Describe actual operational tests performed and equipment used and list personnel performing tests.
   b. Record in tabular form all test results, deficiencies, and corrective measures.
7. Termination
   a. Performance verification test shall be terminated by the Authority when:
      1) Individual systems, system components, subsystems, or cabling infrastructure fail to perform as specified.
      2) It is determined that a system or sub-system is missing any components or installation is not complete.
   b. Upon termination, corrective work shall be performed and performance verification test rescheduled with the Authority.
   c. Retesting shall be performed by Contractor at no additional expense.

d. Contractor shall continue to perform corrective actions and retest until system passes all tests to satisfaction of the Authority.

I. Endurance Testing
1. Provide personnel to monitor the system operation 24 hours per day, including weekends and holidays during endurance testing.
2. Start test after:
   a. Successful completion of performance verification testing.
   b. Training as specified has been completed.
   c. Correction of deficiencies has been completed.
   d. Receipt of written start notification from the Authority.
3. Monitor all systems during endurance testing. Coordinate monitoring with the Authority.
4. Recording: Record data on approved forms so as to provide a continuous log of systems performance. Include:
   a. Date and time for all entries.
   b. Name of individual making entry.
   c. Environmental conditions.
   d. Authority activities in process.
   e. Description of all alarm annunciations, responses, corrective actions, and causes of alarms. Classify as to type of alarm.
   f. Description of all equipment failures, including software errors.
   g. Description of all maintenance and adjustment operations performed on system.
   h. Daily and weekly tabulations.
   i. Daily entries of performance data shall be reviewed by the Authority's representative designated to observe monitoring of system.
5. The Authority may terminate testing at any time when any system, sub-system, system component or cabling infrastructure fails to perform as specified. Upon termination of testing, the Contractor shall commence an assessment period.

J. Adjustment, Correction, and Maintenance
1. During endurance testing make adjustments and corrections to system only after obtaining written approval of the Authority.
2. During endurance testing, perform required maintenance on systems including provision of replacement parts.

K. Final Inspection and Acceptance
1. After endurance testing is complete, review tabulated records with the Authority.
2. The Contractor will not be responsible for failures caused by:
   a. Outage of main power in excess of backup power capability provided that automatic initiation of all backup sources was accomplished and automatic shutdowns and restarts of systems performed as specified.
   b. Failure of any Authority furnished power, communications, and control circuits provided failure was not due to Contractor furnished equipment, installation, or software.
   c. Failure of existing Authority equipment provided failure was not due to Contractor furnished equipment, installation, or software.

3. When performance of integrated system does not fall within the above rates, determine cause of deficiencies, correct, and retest.
   a. When requested by the Authority, extend monitoring period for a time as designated by the Authority.
   b. Submit final report of endurance testing containing all recorded data.
4. The Contractor shall submit written certification that:
   a. The Contract Documents have been reviewed.
   b. All required as-built documentation has been submitted and approved by the Authority.
   c. The Project had been inspected for compliance with the Contract Documents.
   d. The Work has been completed in accordance with the Contract Documents.
   e. The equipment and systems have been tested and are shown operational in the presence of the Authority.
   f. The Project is completed, and is ready for final inspection.

3.13 TRAINING

A. General
1. By means of training classes augmented by individual instruction as necessary, the Contractor shall fully instruct the Authority's designated staff in the operation, adjustment and maintenance of all products, equipment and systems. The Contractor shall be required to provide all training aids, e.g., notebooks, manuals. The Contractor shall provide an appropriate training area equipped with all required equipment. The location of the training area shall be coordinated with the Authority.
2. All training shall be completed a minimum of two weeks prior to system cut over. Training schedule shall support the various work shifts of airport and tenant personnel and shall be subject to the Authority approval.
3. Training shall be conducted by experienced and factory authorized personnel and supported by training aids. An adequate number and amount of training material shall be provided by the Contractor. The following is considered a minimum.
   a. Functional flow-charts, overall block diagrams, and descriptive material for all software;
   b. Schematic drawings for each of the hardware components;
   c. All procedure manuals, specification manuals, and operating manuals;
   d. Detailed as-built drawings.
4. Participants shall receive individual copies of technical manuals and pertinent documentation at the time the course is conducted. The courses shall be scheduled such that Authority personnel can participate in all courses (no overlap).
5. A final course schedule and syllabus shall be prepared by the Contractor for each course to be conducted for Authority personnel, and submitted for review at least four (4) weeks prior to the scheduled date of the course commencement.

6. Each course outline shall include, in addition to the subject matter, a short review of the prerequisite subjects (where appropriate); how this course fits into the overall training program; the objective; the standards of evaluation; and any other topics that will enhance the training environment.
7. Provide detailed video recordings in high quality digitally formatted media of all demonstration and training of all systems and system operations.
   a. Utilize remote microphones as may be required to ensure high quality audio of the recorded demonstrations.
   b. Permanently and professionally label all recorded materials and provide self-sealing plastic cases for each training session.
8. All training requirements identified are minimum requirements.

B. Types of Training
1. User Training: System users shall be instructed in all aspects of operations of the system, including the business intelligence tool and all reporting functions and shall conform to the following minimum requirements:
   a. Training classes shall be scheduled not less than 48 hours apart to allow The Authority's User/Operators to familiarize themselves with all system operations.
      1) Basic Training: Provide twelve (12) hours of basic user training shall be provided (2-hour class repeated 6 times spaced over a two-week interval. User training shall be conducted at a location that is coordinated with the Authority.
      2) Advanced Training: Provide twelve (12) hours of advanced user training shall be provided (4-hour class repeated 3 times with six advanced users per class). User training shall be conducted at a location that is coordinated with the Authority.
      3) System Administrator Training: System Administrator Training shall be provided. System Administrator Training shall include both classroom work and field training.
      4) Software/Operational Training: Provide twenty-four (24) hours of software training (24 hours of training shall be repeated 1 time for 1 system administrator).
2. The Contractor shall structure each training course to describe all systems, software and applications as well as support programs. This course shall include a functional overview of the complete software and operations of each system. The course material must be presented in depth by a factory authorized instructor and shall covering in detail at the minimum all system functions, features rebooting and maintenance criteria.
3. Provide operation, parts, and maintenance manuals defining operation and troubleshooting methods of all systems and review with The Authority's User/Operators as part of training demonstrations.
4. Provide detailed video recordings in high quality digitally formatted media of all demonstration and training of all systems and system operations.
   a. Utilize remote microphones as may be required to ensure high quality audio of the recorded demonstrations.

b. Permanently and professionally label all recorded materials and provide self-sealing plastic cases.

3.14 PROJECT CLOSEOUT REQUIREMENTS

A. In addition to all final close requirements as specified by Division 01, the Contractor shall comply with all requirements of this Section.

B. Final System Acceptance
1. In addition to the requirements set forth in Division 01, the Contractor shall prepare and issue a Certificate of Project Completion, containing:
   a. The date of project completion.
   b. A list of items that have been corrected by the Contractor.
   c. The time and date the Authority will assume possession of the system (transfer of ownership).
   d. The date that warranty begins.
2. The Authority will perform an inspection after receipt of written certification. The project completion inspection shall include, but not be limited to:
   a. The project's contracted work and any additional change orders.
   b. All equipment and systems tested and shown operational in the presence of the Authority.
3. After the inspection the Authority will prepare and submit to the Contractor, a list of items to be completed or corrected, as determined by the inspection, along with the designated timeframe for completion.
4. Should the Authority consider the work not to be complete, the Authority will immediately notify the Contractor, in writing, stating the reasons. The Contractor shall complete the work, and then send a second written notice to the Authority certifying that the Project is complete. The Authority shall then re-inspect the work upon Contractor's request at a scheduled re-inspection time.
   a. At any time, the Authority shall have the right to Contract with a third party in order to complete and/or inspect any work of which Contractor failed to conform with the Contract requirements. All cost for this third party shall be borne by the original Contractor responsible for delivering the project.

C. Inspections
1. At the completion of the project and prior to final acceptance of the Work, provide evidence of final inspections and approvals to The Authority, in accordance with all requirements of the Contract Documents as well as required by the authorities having jurisdiction.
2. Authority approval is required prior to final system acceptance and payment.

END OF SECTION 27 05 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, and all related Specification Sections, shall all apply to this Section.

B. Related Specification Sections:

1. Division 26 – Common Work Results for Electrical
2. Division 26 – Building Wire and Cable
3. Division 26 – Grounding and Bonding
4. Division 26 – Hangers and Supports
5. Division 26 – Conduit
6. Division 26 – Outlet Boxes
7. Division 26 – Pull and Junction Boxes
8. Division 26 – Underground Ducts and Raceways for Electrical Systems
9. Division 26 – Identification for Electrical Systems
10. 27 05 00 – Common Work Elements for Communications
11. 27 05 50 – Internet Protocol Television Distribution (IPTV)
12. 27 10 00 – Structured Cabling System
13. 27 10 10 – Voice Over IP Telephone System
14. 27 10 15 – Wireless Local Area Network
15. 27 15 16 – Public Announcement System (PA)
16. 27 21 00 – Data Network Communications Equipment
17. 27 42 16 – Multi-User Flight Information Display System (MUFIDS)

C. Reference Symbols:

1. Refer to specification Section 27 05 00 for additional information.

D. Abbreviations:

1. Refer to specification Section 27 05 00 for additional information.

E. Definitions:

1. Refer to specification Section 27 05 00 for additional information.

1.2 SUMMARY

A. In addition to all requirements stipulated in Specification 27 05 00, this section contains the overall requirements and design intent associated with the grounding and bonding of all

Division 27 infrastructures as it relates to the installation of the following communications, cabling, equipment and systems:

1. Premise Distribution System
2. VoIP Telephone System
3. Wireless Local Area Network (WLAN) and Bluetooth Wayfinding Beacons
4. Common Use Passenger Processing Systems
5. Common Use Self-Service Systems
6. Queue Management System
7. Multi-User Flight Information Display System (MUFIDS)
8. IP Master Antenna Television System
9. Global Positioning System (GPS)
10. Public Address / Paging / Emergency Communications System
11. Access Control System (ACS)
12. Video Surveillance System (VSS)

B. Additionally, this section also addresses all requirements for submittals, quality assurance, product handling, record documents, project conditions, installation, system performance, demonstrations, testing, and certifications related to the grounding and bonding of all network communication cabling and equipment for this project. Refer to specification Section 27 05 00 for additional project requirements.

C. Use of Premises

1. Refer to specification Section 27 05 00 for additional information.

D. Coordination

1. Refer to specification Section 27 05 00for additional information.

1.3 SCOPE OF WORK

A. Refer to related Division 27 specification sections and "T" series drawings for all Division 27 project scopes of work including but not limited to all cabling infrastructures, network equipment, and connected systems when applying all grounding and bonding applications.

B. At the minimum, the scopes of work covered as herein specified shall include but are not limited to all necessary labor, equipment, material, cabling, commissioning, and testing as well as all appurtenances necessary for the proper installation and fully functional grounding and bonding system to support all Division 27 communications systems for this project.

1. Additional requirements of all related specification sections shall also apply. It shall be the Contractor's responsibility for full compliance with all requirements of 27 05 00 as well as all related specification sections as necessary to deliver complete and fully functional grounding and bonding infrastructure in accordance with the requirements of all Contract Documents.

1.4 REFERENCES

A. In addition to the references stipulated in Specification 27 05 00 the following shall also apply;

1. American Society for Testing and Materials (ASTM):

   a. B 3 Soft or Annealed Copper Wires
   b. B 8 Concentric-Lay-Stranded Copper Conductors, Hard, Medium Hard, Soft
   c. B 33 Tinned Soft or Annealed Copper Wire for Electrical Purposes

2. Institute of Electrical and Electronic s Engineers (IEEE):

   a. 142-82 Recommended Practice for Grounding of Industrial and Commercial Power Systems
   b. 383-2.5 IEEE Standard for Type Test of Class IE Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations
   c. 1100 Recommended Practice for Powering and Grounding Sensitive Electronic Equipment in Industrial and Commercial Power Systems

3. Underwriters' Laboratories (UL):

   a. 83 Thermoplastic Insulated Wire and Cables
   b. 96 Lightning Protection Components
   c. 96A System Installation
   d. 467 Grounding and Bonding Equipment

4. National Fire Protection Association (NFPA):

   a. 780 Lightning Protection Code
   b. 70 National Electrical Code (NEC)

      1) NEC Article No. 250 – Grounding

5. American National Standards Institute/Telecommunications Industry Association/Electronic Industries Alliance (ANSI/TIA):

   a. J-STD-607-A Commercial Building Grounding and Bonding Requirements
   b. Telcordia – Network Equipment Building Systems (NEBS) GR-1275

6. Building Industry Consulting Services International (BICSI):

   a. Telecommunications Distribution Methods Manual (TDMM 13)
   b. Customer Owned Outside Plant Design Manual (CO-OSP 3rd Edition)
   c. ECA/BICSI 607-2011, Standard for Telecommunications Bonding and Grounding Planning and Installation Methods for Commercial Buildings

1.5 SYSTEM DESCRIPTION

A. Design Requirements

1. In addition to the requirements stipulated by specification Section 27 05 00 the following shall all apply in the design, and installation of all grounding and bonding applications;

   a. ANSI J-STD 607-B - Generic Telecommunications Bonding and Grounding (Earthing) for Customer Premises.
   b. BICSI Telecommunications Distribution Methods Manual
   c. ANSI/NECA/BICSI 607 - Standard for telecommunications bonding and grounding
   d. NEC Article No. 250 - Grounding
   e. IEEE 1100 - Recommended Practices for Powering and Grounding Sensitive Electronic Equipment
   f. IEEE 142-82 - Recommended Practice for Grounding of Industrial and Commercial Power Systems

2. Bond the following items within the telecommunications grounding system.

   a. All communications system active equipment.
   b. All POU and surge protection equipment.
   c. Raised floor systems.
   d. Underfloor grounding grids (a.k.a. "supplemental bonding grids" or SBGs) for computer or telecommunications rooms.
   e. Metallic raceway systems, including metallic cable trays.
   f. Communications equipment enclosures (cabinets) or cross-connect frames.
   g. Broadband passive devices.
   h. Metallic splice cases.
   i. Metallic cable screens, armor or shields.
   j. All metal cable conduit.
   k. Electrical service panels in entrance facilities, telecommunications and equipment rooms.
   l. Wall and rack mounted grounding busbars.
   m. Exposed building steel that is within 6 feet of equipment racking systems.
   n. Building steel extending to earth in outside-plant.
   o. All related bonding accessories.
   p. Completely protect above-surface structures and equipment.
   q. Calculate system on the basis of existing soil resistivity.
   r. If cathodic protection for underground sewer pipe is installed ensure the pipe is not connected to the general grounding system, either directly through grounding cable or indirectly through grounded electrical devices connected to the pipe.

      1) Electrically isolate electrical devices from sewer pipe.

B. All electronic equipment, conduits, cable trays, racks/cabinets and cable shields shall be properly grounded and bonded in accordance with all requirements of ANSI/TIA 607-A, NEC 250 and IEEE 1100.

1. A Telecommunications Grounding System shall be installed in all communications equipment rooms. Grounding system shall provide equalization of the grounding potentials between the building power system and the telecommunications main grounding bus-bar (TMGB) as well as all telecommunications grounding bus-bars (TGB).

    a. Grounding bus-bar shall provide the diversion of electrical transients from the telecommunications cables and to provide a safety ground for all equipment racks/cabinets, conduits, cable trays and cable shields as well as providing the required coupling to cancel and/or reduce transients.

2. The TMGB and each TGB shall be provided where indicated on the drawings and shall provide an effective bonding connection to the nearest approved building grounding electrode (e.g., structural steel) as well as to the local power distribution panel grounding system (e.g., ac branch circuit panel board's equipment grounding busbar.

    a. The minimum bonding shall be #6 AWG copper conductor connected to the TMGB and all TGB's. Connections shall be 2-hole NEMA type compression or exothermic welded connections.

        1) Metallic cable shield shall NOT be used as a Telecommunication Bonding Backbone (TBB).

        2) Interior water piping system shall NOT be used as a TBB.

3. All grounding connections shall provide the equalization of all grounding potentials between the building power system and the grounding terminations at the communications equipment in order to provide the diversion of electrical transients as well as providing the necessary coupling in order to cancel and/or reduce any voltage transients.

    a. The Contractor must provide accessible means to a direct electrical service ground, which is one of the best points for grounding communications systems. NEC Section 250.94 and 800.100 requires an intersystem bonding connection accessible at the electrical service equipment, such as:

        1) Approved external connection on the power service panel.

        2) Exposed metallic service raceway (using an approved bonding connector).

        3) Grounding electrode conductor.

    b. For grounding connectivity between buildings, rooms and/or spaces all bonding conductors are to be installed in dedicated conduits and conform to NFPA 70 fill ratios. All conduits shall be properly grounded end to end and all grounding conductors shall be sized in accordance with ANSI-J-STD-607-B.

1) Refer to the following Chart for minimum grounding conductor size and length requirements.

TBB Conductor Length Size vs.	
TBB/GE Linear Length	TBB/GE Size
Feet (m)	(AWG)
Less than 13' (4) 6	6
14–20' (4 -6)	4
21–26' (6–8)	3
27–33' (8–10)	2
34–41' (10–13)	1
42–52' (13–16)	1/0
53–66' (16–20)	2/0
37–84' (20–26)	3/0
85–105' (26–32)	4/0
*Reference ANSI-J-STD-607-B for more information.	

c. Equipment Grounding: All metallic structures, equipment racks, cabinets and enclosures as well as all raceways, cable trays, junction boxes, outlet boxes, machine frames, and other conductive items shall be bonded and grounded in accordance will applicable codes and standards.

d. Duct Banks and Manholes: Provide an insulated equipment grounding conductor in each duct containing any voltage conductors, sized per NEC except that minimum size shall be No. 2 AWG. Bond the equipment grounding conductors to the grounding bus, to all manhole hardware and ground rods, to the cable shielding grounding provisions for all cable splices, terminations and equipment enclosures.

e. Metallic Fences equipped with communications equipment: Fences shall be grounded with a ground rod at each fixed gate post and at each corner post.

1) Drive ground rods until the top is 300 mm (12 inches) below grade. Attach a No. 4 AWG copper conductor, by exothermic weld to the ground rods and

extend underground to the immediate vicinity of fence post. Lace the conductor vertically into 300 mm (12 inches) of fence mesh and fasten by two approved bronze compression fittings, one to bond wire to post and the other to bond wire to fence.

2) Each gate section shall be bonded to its gatepost by a 3 by 25 mm (1/8 by one inch) flexible braided copper strap and ground post clamps. Clamps shall be of the anti- electrolysis type.

4. All connections of grounding conductors to ground rods, bus bars, rebar, structural members, pipes and fences, as well as splices of any ground conductors, shall be made by exothermic welds except where otherwise noted. All connections to bar lugs shall be exothermic weld or compression type connections. Bolted type connection of ground conductors may only be made where terminal lugs or blocks have been furnished and installed in equipment by the manufacturer.

a. Equipment grounding conductors shall be insulated stranded copper, except for sizes No. 10 AWG and smaller shall be solid copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes No. 4 AWG and larger shall be permitted to be identified per the NEC.

1) At the minimum bonding connection shall be a #6 AWG copper conductor. All grounding shall provide an effective bonding connection between the protected equipment to the nearest approved building grounding electrode (structural steel) as well as to the local power distribution panel grounding system (e.g., ac branch circuit panel board's equipment grounding busbar). All bonding and grounding connections shall be NEMA type compression or exothermic welded connections.

5. Refer to related specification sections for any additional grounding and bonding requirements.
6. A Telecommunications Grounding System shall be installed in all communications equipment rooms. Grounding system shall provide equalization of the grounding potentials between the building power system and the telecommunications main grounding bus-bar (TMGB) as well as all telecommunications grounding bus-bars (TGB).

a. Grounding bus-bar shall provide the diversion of electrical transients from the telecommunications cables and to provide a safety ground for all equipment racks/cabinets, conduits, cable trays and cable shields as well as providing the required coupling to cancel and/or reduce transients.

1.6 SUBMITTALS

A. In addition to the submittal requirements as stipulated by Division 01, Specification Section 27 05 00 as well as all related specifications sections, the Contractor shall also conform with the following submittal requirements:

1. Product Data:

   a. Manufacturers catalog data and applicable special fabrication and installation details.
   b. Installation, terminating and splicing procedures.
   c. Instructions for handling and storage.
   d. Dimensions and weights of material.
   e. Conformance Certificate and Quality Assurance Release: Signed by Owner.
   f. Specifically identify products and include purchase order number, supplements, and item number where applicable. Indicate that requirements are met and identify approved deviations.
   g. Include recommended spare parts list for approval by Owner.

1.7 QUALITY ASSURANCE

A. In addition to the requirements as stipulated by Specification Section 27 05 00 as well as all related specifications sections, the following shall also apply:

   1. The Contractor shall furnish and install only products of latest proven design, new and in current production. Use of obsolete components or out-of-production products shall not be acceptable.
   2. All cable shall pass vertical tray flame test in accordance with IEEE 383-2.5 standards.

1.8 DELIVERY STORAGE AND HANDLING

A. In addition to all requirements as stipulated by Specification Section 27 05 00 as well as all related specifications sections, the following shall also apply.

   1. Protect wire wood lagging or suitable barrier across the traverse of reels. Provide heat-shrink self-sealing end caps on cable.
   2. Protect wire wood lagging or suitable barrier across the traverse of reels. Provide heat-shrink self-sealing end caps on cable.

1.9 RECORD DOCUMENTS

A. Refer to specification Section 27 05 00 for additional information.

1.10 OPERATIONS AND MAINTENANCE

A. Refer to specification Section 27 05 00 for additional information.

1.11 SOFTWARE AGREEMENT

A. Not Applicable

1.12 EXTRA MATERIAL

A. Not Applicable

1.13 ENVIRONMENTAL CONDITIONS

A. Refer to specification Section 27 05 00 for additional information.

PART 2 - PRODUCTS

2.1 MANUFACTURED PRODUCTS

A. In addition to all requirements as stipulated by Specification Section 27 05 00 as well as all related specifications sections, the following shall also apply:

1. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, that meet and/or exceed the specified performance and features of the equipment and/or systems and for which replacement parts shall be readily available to the contractor and/or Owner.
2. The equipment specified is based on the acceptable manufacturers listed. Where "or equal” is stated, equipment shall be equivalent in every way to that of the equipment specified, and subject to approval.

    a. When more than one unit, device, or component of the same class of equipment is required, such units, devices, or components shall be the product of a single manufacturer.

3. Acceptable manufacturers for each system shall be as specified and shall be provided in full compliance with the requirements of this and all related specification sections and contract drawings.

    a. Manufacturers listed as acceptable shall not negate the contractors’ responsibility for providing all equipment, devices, components, and/or systems, in accordance with all functions and performance requirements of the Contract Documents.

B. Manufacturers

1. Cable Manufacturers/Suppliers:

    a. Houston Wire and Cable Company
    b. Okonite Company
    c. Anixter

d. Graybar
e. CSC (Communication Supply Company)
f. Cablec Continental Cables Company
g. Pirelli Cable Corporation
h. Triangle Wire and Cable, Inc.

2. Ground Rod and Connector Manufacturers:

a. Copperweld
b. Thomas and Betts
c. Blackburn

3. Exothermic Connector Manufacturers:

a. Erico Products (Cadweld)
b. Burndy Corporation (Therm-O-Weld)
c. OZ Gedney

4. Grounding Connector Manufacturers

a. Thomas and Betts
b. Burndy Corporation
c. O.Z. Gedney
d. Panduit

5. Telecommunications Busbars:

a. Erico Products
b. Cooper B-Line
c. CPI Chatsworth
d. Panduit

C. Materials

1. Grounding Conductors: Bare or insulated copper AWG wire following ASTM-B3, ASTM-B8 and ASTM-B33, of following sizes:

a. A minimum of 6 AWG, stranded, insulated (green) copper conductor should be used for communications since this accommodates different code requirements and allows for future changes.
b. Metallic cable shield shall NOT be used as a Telecommunication Bonding Backbone (TBB).
c. Interior water piping system shall NOT be used as a TBB

2. Grounding Connectors: It is recommended that connectors should be one of the following:

a. Tin-plated copper

b. Copper
c. Copper alloy

3. Ground Rods: A minimum of 10 feet long, 3/4-inch diameter, copper-clad steel.

   a. Where single conductor insulated grounding conductors is required, furnish green color (or tape marking) insulation rated for 600 volts.

4. Telecommunications Main Grounding Busbar (TMGB):

   a. The TMGB shall be a predrilled copper busbar with standard NEMA bolt hole sizing and spacing for the type of connectors to be used. (Both holes in two holed lugs must be attached to busbar)
   b. The TMGB shall be sized for the immediate requirements and allow for 100% growth.
   c. The minimum busbar dimensions are .25” thick x 4” wide x 20” long.
   d. The busbar shall be electro-tin plated for reduced contact resistance.

5. Telecommunications Grounding Busbar (TGB):

   a. The TGB shall be a predrilled copper busbar with standard NEMA bolt hole sizing and spacing for the type of connectors to be used. (Both holes in two holed lugs must be attached to busbar)
   b. The TGB shall be sized for the immediate requirements and allow for 100% growth.
   c. The minimum busbar dimensions are .25” thick x 2” wide x 12” long.
   d. The busbar shall be electro-tin plated for reduced contact resistance.

6. Rack-Mounted Grounding Busbar (RMGB):

   a. The RMGB shall be a predrilled copper busbar with standard NEMA bolt hole sizing and spacing for the type of connectors to be used. (Both holes in two holed lugs must be attached to busbar)
   b. The TGB shall be sized for the immediate requirements and allow for 100% growth.
   c. The minimum busbar dimensions are 1/16” thick x 19” wide x 3/4” long.
   d. The busbar shall be electro-tin plated for reduced contact resistance.

PART 3 - EXECUTION

3.1 COORDINATION

A. In addition to all requirements as stipulated by Specification Section 27 05 00 as well as all related specifications sections, the following shall also apply:

1. The contractor shall coordinate with the appropriate trade all conditions impacting the installation of the grounding and bonding of any cables, conduits, cable trays, or systems including but not limited to all equipment locations, communication room/spaces, ceilings, lighting fixtures, fire protection piping, and ductwork layouts to the satisfaction of all concerned trades, subject to final review by the County.

    a. Coordinate exact location of all desktop/counter mounted equipment with the County, as well as all affected trades and tenants prior to the installation of any required grounding or bonding conductors.
    b. Coordinate exact location(s) of all above ceiling grounding and bonding conductors, conduits, equipment, and/or devices with all architectural plans, reflected ceiling plans and affected trades prior to installation.
    c. Grounding and bonding installations requiring coordination with other trades the contractor shall provide all templates, backboxes and equipment anchor bolts for mounting or flush mounting preparation, (e.g. pedestals or other devices requiring mounting on walls, concrete pads or other materials). Coordinate delivery of templates and equipment anchor bolts to preclude any delay in the construction schedule or the work of the affected trade.
    d. If installation of conductors, conduits, devices or components is performed prior to coordination with other trades, which interferes with work of other trades or operation and maintenance of the facility, make necessary changes to correct the condition at no additional cost to the Owner.

2. Provide coordination with all system sub-contractors and trades the proper installation of all grounding and bonding conductors, equipment, or components, necessary to provide fully functional grounding and bonding systems in accordance with all applicable specification sections.

B. The Contractor shall maintain a complete set of current and up to date shop drawings and equipment submissions at the job site at all times. Shop drawings, equipment submissions and all other documents submitted for review shall be made available on site to the County upon request.

C. Coordinate any work scheduled to be provided by the County that impact the scope of work associated with the grounding and bonding requirements of this project. Schedule all work to ensure that the work of the Owner and all Owner Vendors can proceed in accordance with the Project Schedule.

3.2 PREPARATION

A. Complete site preparation and soil compaction before trenching and driving ground rods for underground use.

1. Verify exact location of stub-up points for grounding of equipment, fences and building or steel structures.
2. Verify wiring for all electrical equipment and/or systems is single conductor cable in conduit and each conduit contains a green-color insulated equipment-grounding

conductor connected to lighting system. If no ground conductor is present, install conductors as required.

3. All copper and copper alloy connections should be cleaned prior to connection.

3.3 EQUIPMENT PROTECTION

A. Refer to specification Section 27 05 00 for additional information.

3.4 WORK PERFORMANCE

A. In addition to all requirements as stipulated by Specification Section 27 05 00 as well as all related specifications sections, the following shall also apply:

1. Coordinate the grounding and bonding of all cabling, conduits/raceways and cable trays and equipment with applicable trades to ensure proper conductivity and function of all grounding and bonding terminations in accordance with all related specification sections. Refer to Division 01 Specification Section for additional project coordination requirements.

a. Coordinate with all trades at the time of shop drawing submission detailing all conditions impacting the installation of any grounding and bonding conductors or components. The contractor shall coordinate with the appropriate trade all conditions impacting the grounding and/or bonding of any system, conduit, or cable tray including but not limited to all communications rooms, equipment locations, site conditions, and above ceiling spaces, to the satisfaction of all concerned trades, subject to final review by the County.

1) Coordinate exact location of all desktop/counter/wall mounted equipment with the County and all affected trades prior to the installation of any grounding conductors.

2) Coordinate exact location(s) of all grounding conductors, conduits, equipment and/or device installations with all architectural plans, site plans, reflected ceiling plans and affected trades prior to installation.

a) Equipment installations requiring coordination with other trades the contractor shall provide all templates, back- boxes and equipment anchor bolts for mounting or flush mounting preparation, (e.g. pedestals or other devices requiring mounting on walls, concrete pads or other materials). Coordinate delivery of templates and equipment anchor bolts to preclude any delay in the construction schedule or the work of the affected trade.

3) If installation of any grounding or bonding devices, conductors, and/or conduit is performed prior to coordination with other trades, which interferes with work of other trades or operation and maintenance of the facility, make

necessary changes to correct the condition at no additional cost to the County.

3.5 INSTALLATION

A. In addition to all requirements as stipulated by Specification Section 27 05 00 as well as all related specifications sections, install all grounding and bonding scopes of work in accordance with manufacturer’s recommendations, approved submittals as well as all applicable codes and standards.

1. The Contractor shall provide all tools and test equipment required to install, verify, and test the installation and to determine that it meets the specifications. The Contractor shall furnish all necessary materials required to implement and to achieve the required work performance.
2. All equipment shall be installed in a neat and workmanlike manner. All methods of construction that are not specifically described or indicated in the Specification shall be subject to the control and approval of the County.
3. Follow manufacturers' instructions for installing, all components and making all conductor terminations. Submit two (2) copies of such instructions to the County before installing any devices or conductors and grounding and bonding of any equipment. Provide an additional copy of such instructions at the equipment during any work on the equipment. Where no instructions are included with the equipment, follow accepted industry practices and workmanlike installation standards.
4. Grounding busbars and termination component locations shall be as close as practical to locations as indicated on the contract drawings.

    a. Provide all appropriate clearances in accordance with NEC requirements. Arrange busbars and termination components to facilitate unrestricted access for maintenance and service of all equipment, components, and/or conductor terminations.

5. Where the County determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the project.

    a. "Conveniently accessible" is defined as being capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as, but not limited to, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.

6. Installation\Mounting of all grounding and bonding hardware, components, equipment and/or appurtenances must comply with the appropriate IBC Seismic requirements for the region.

    a. Where undefined by codes and standards, Contractor shall apply a safety factor of at least 2 times the rated load to all fastenings and supports of system components.

7. For equipment mounted in drawers or on slides, provide the interconnecting grounding conductor where required. Grounding conductor shall be provided with a service loop of not less than three feet and ensure that the cable is long enough to allow full extension of drawer or slide.

B. All grounding and bonding installations shall be in accordance with good engineering practices, NEC, local building codes, and all manufacturer's requirements. Conductor terminations at all equipment locations shall comply with all state and local electrical codes. Test all grounding and bonding connections for continuity, resistance and errant current flow to ground immediately after termination.

1. Bonding conductors shall be routed with minimum bends or changes in direction and should be made directly to the points being bonded, and shall be one continuous run NO splices.
2. Bonding connections should be made by using:

   a. Double crimp connectors only for all horizontal runs (cabinets trays etc.). Use listed hardware that has been laboratory tested. For double crimp connectors use 2-hole type connector.
   b. Exothermic welding (per NEC) within the ground electrode system, for parts of a grounding system that are subject to corrosion or that must carry high currents reliably, or for locations that require minimum maintenance. Exothermic-weld to be used on the Telecommunications Bonding Backbone (TBB) conductor for all connections.

3. Install main ground loop minimum 18" (inches) below ground surface.
4. Drive grounding rods vertically, so at least 8 feet of rod is in contact with the soil. All connections shall be exothermic-weld. Install additional ground rods as required to pass resistance test.
5. Make connections only to dry surfaces with paint, rust, oxidation, scales, grease, dirt or other foreign material is removed. Ensure proper conductivity.
6. Make above-grade grounding connections with Exothermic-weld.

   a. Ground small groups of isolated equipment with No. 3/0 minimum insulated conductor connected to the main loop.

C. Equipment Grounding:

1. Make grounding connections to electrical equipment, vessels, mechanical equipment, equipment enclosure, relay racks, and ground rods in accordance with NEC.
2. Make grounding connections to tanks and vessels to integral structural supports or to existing grounding lugs or pads, and not to the body of the tank or vessel.

D. Telecommunications Raceway and Support Systems Grounding:

1. Bond and ground raceway, cable rack or tray and conduit together and permanently ground to the equipment grounding busbar. Connection to conduit may be with grounding bushing.

2. Connect ladder-type cable tray to grounding electrode system. Telecommunications cable tray that is in the same room, as the TGB shall be connected to the TMGB.
3. Bond and ground raceway at low voltage motor control centers or other low voltage control equipment, except conduit which is effectively grounded to sheet metal enclosure by bonding bushing or hubs need not be otherwise bonded.
4. Where only grounding conductor is installed in a metal conduit, bond both ends of conduit to grounding conductors.
5. Provide flexible "jumpers" around raceway expansion joints and across cable tray joints parted to allow for expansion and hinged cable tray connections. Provide copper bonding straps for steel conduit.

E. Telecommunications Grounding and Bonding Infrastructure:

1. Install the TMGB in the Telecommunications Entrance Facility (TEF) or Main Distribution Frame (MDF) as close to the panel-board as possible. The TMGB should also be located so that the bonding conductor is as short and straight as possible. Maintain clearances required by applicable electrical codes.
2. If a panel-board is not installed in the TEF or MDF, locate the TMGB near the backbone cabling and terminations.
3. The TMGB shall be insulated from its support with a recommended separation of 2 inches.
4. Connect the TMGB to the electrical service ground and telecommunications primary protectors.
5. The minimum Telecommunications Bonding Backbone (TBB) conductor size shall be No. 2 AWG. The TBB originates at the TMGB and extends throughout the building using the telecommunications backbone pathways, and connects to the TGB(s) in all telecommunication closets and equipment rooms.
6. Install the TGBs in the telecommunications closets and equipment rooms as close to the panel-board as possible. The TGB should also be located so that the bonding conductor is as short and straight as possible. Maintain clearances required by applicable electrical codes.
7. The TGB shall be insulated from its support with a recommended separation of 2 inches.
8. Properly bond and ground all communications cabinets, equipment racks, raceway, cable rack or tray, and conduit directly to TMGB or TGB.

    a. Daisy chaining of equipment is not permitted

9. Preparation: Copper and copper alloy connections shall be cleaned prior to connecting.
10. Bonding conductors shall be routed with minimum bends or changes in direction and should be made directly to the point being bonded. Change of direction shall be taken over as wide a radius as possible with a minimum radius of one foot.
11. Make connections only to dry surfaces with paint, rust, oxides, scales, grease and dirt removed. Ensure proper conductivity.
12. Grounding conductors, by gauge, shall be continuous, with splices, from a larger gauge feeder to the last frame or component served by the grounding lead (ex. 750 KCM to 500 KCM to 1/0, etc.).

a. C-Taps from Aisle equalizer to a frame can be the same gauge (ex. E.g., 6 AWG to 6 AWG).
b. Cable to Cable taps shall be made with exothermic weld, or listed compression connectors.

13. No aluminum conductors or connectors shall be used in any bonding and grounding system.
14. Ground bars not supplied as part of a standard assembly shall be copper or tinned copper.
15. Both ends of the grounding conductors shall be equipped with a printed destination label recording the far end termination. The label shall be applied within 6 inches of the termination and be visible from the floor.
16. All metallic items that interact electro-magnetically with Network/Telecommunications equipment shall have their framework bonded and grounded to the Telecommunications grounding system with a minimum #6 AWG grounding conductor. Example includes switch frames, power plants frames, battery stands, storage cabinets and other metallic objects, etc. "Daisy Chaining" or frame to frame connecting of these conductors is NOT permitted.
17. TMGB and TGB shall be stenciled and labeled per ACAA requirements. Refer to related specification section 27 05 53 for additional information related to identification and labeling of communication infrastructure.
18. Refer to "T" series drawings for applicable grounding and bonding details as well as all related specification sections for any additional information to all grounding and bonding requirements.

F. Fences and Gates located in the equipment rooms:

1. Ground all fences, fence posts and gates used in the segregation of any communications rooms to nearest TMGB or TGB in accordance with all requirements as herein specified.

G. Telecommunications Cable Armored and/or Shielded:

1. Terminate and ground shield of shielded control cable at one end only, preferably at the control panel end for instrument and communication cable and at the supply end for electronic power cables. Maintain shield continuity by jumping the ground shield across connection point where it is broken at junction boxes or other splice points.
2. Connect ground wire in power cable assemblies at each terminal point to a ground bus, if available, or to the equipment enclosure.

   a. Do not extend these ground wires through "doughnut" CTs used for ground fault relaying, but do extend ground leads from stress cones. Ground power cable armor and shield at each terminal point.

3. Bond and ground exposed cable shields and metallic sheaths according to the manufacturer's guidelines. They should also be grounded as close as possible to the point of entrance.

4. Intra-building telecommunications cabling that is armored or has a metallic shield must be bonded to the building grounding system at each end.
5. The Contractor's quality assurance Inspector shall conduct a visual inspection of all grounding and bonding connections to verify that all installations and terminations are in accordance with the applicable code, standard and manufacturer's requirements. Record of all inspections shall be signed and dated by the Quality Assurance Inspector and provided to the County. Prior to any scheduled inspections, the County representative shall be notified by the Contractor of any inspection(s) so they may witness.

H. Hardware, Component or Equipment Installation

1. The Contractor shall install and inspect all hardware, materials, components, equipment and/or system installations in accordance with this and related specification sections as well as all applicable codes, standards and manufacturer's requirements. Location of all hardware, component or equipment installation shall be documented at the time of submittals and is subject to the County approval.
2. The Contractor shall be responsible for any and all loss or damage in the shipment, delivery and installation of all hardware, component or equipment until transfer of title to the Owner.
3. The Contractor shall obtain written permission from the County before proceeding with any work which requires cutting into or through any part of the building structures such as, but not limited to, girders, beams, concrete, carpeted or tiled floors, partitions or ceilings.

    a. The Contractor shall obtain written permission from the County before cutting into or through any part of the building structures where fireproofing or moisture proofing could be impaired.

        1) In any such case, the Contractor shall be responsible for restoring the affected area to "like-new" condition or to a condition to match the existing conditions.

4. The Contractor shall take all steps necessary to ensure that all construction or public accessible areas remain clear or are properly marked during installation or maintenance.
5. The Contractor shall coordinate installation with the County, to minimize disruption of existing functions at the airport.
6. The Contractor shall install hardware, component or equipment only in those locations that have been previously approved during the submittal review. Any other locations shall be approved, in writing, by the County prior to deviation from shop drawings or installation.
7. The Contractor shall label all hardware, components or equipment cabling in accordance with all requirements of specification section 27 05 53. Coordination of all labeling schemes shall be provided as part of the submittal process and shall be approved, prior to any implementation by County.

I. Conduits/Raceways

1. In addition to all requirements of Specification Section 27 05 00 as well as Specification Section 27 05 26 the Contractor shall provide the following as related to the installation of any grounding and bonding system. Refer to all related specification sections for additional conduit and raceway information.

    a. All conduits/raceways shall be concealed and shall be installed above accessible finished ceilings and/or in walls. Any conduits/raceways installed in areas requiring installation to be exposed, shall be installed as tight as possible to ceilings and at right angles to walls/building lines and shall not obstruct any access hatches, equipment service panels, lighting or other equipment and/or devices. No exposed conduits/raceways shall be installed without prior approval of the County.

        1) Where conduits cannot be concealed above ceilings or in walls and must be installed in finished or occupied areas of the building, all conduits shall be finished wire-mold type raceways or approved equal. Finished wire-mold type raceways shall not be installed without prior approval in writing by the County.

        2) Where any equipment and/or junction boxes are installed above non-accessible finished ceilings, the contractor shall provide access hatches listed for the intended application. Access hatches shall be located so that service access to the equipment and/or junction boxes is unimpeded.

            a) Access hatches shall not obstruct any equipment, service panels, lighting equipment, devices, or any architectural elements of the ceiling. At the time of submittals, the contractor shall submit all proposed access hatch locations for review by the Design Professional

        3) All conduits/raceways shall be supported in accordance with NEC requirements and shall be affixed in such a manner that tampering and/or removal without the use of specialized tools shall be prevented.

        4) All conduits/raceways shall be installed in a manner that prevents tampering or removal when installed in areas exposed to the general population.

            a) Provide tamper-resistant installation utilizing "torx with peg" security-fastening devices for all conduits/raceways, equipment, devices and appurtenances in all areas accessible to the general population and/or areas subjected to tampering or vandalism.

    b. Interior raceways shall be a minimum 1 inch unless otherwise noted. Exterior raceways shall be a minimum 1 1/4-inch. Size all raceways and install conductors in accordance with NEC requirements. Fill ratio shall not exceed 40 percent for indoor raceways or exterior raceways.

1) EMT conduit with compression fittings may be utilized in all inaccessible ceiling areas unless otherwise restricted by code.

2) Threaded Rigid metal conduit shall be used on all exterior applications, stub-ups and all interior areas where concealed conduit requirements cannot be met and are exposed to tampering or damage by the general population.

a) All areas considered being of high risk due to the nature of the occupancy or the need to protect and maintain the integrity of the cabling shall be installed in rigid threaded conduits.

c. Conduit expansion couplings shall be furnished and installed in all areas where expansion/contraction of structure may occur in order to couple two sections of a conduit runs to support longitudinal movement. The contractor shall refer to architectural drawings for exact locations of all building expansion joints.

1) Conduit expansion couplings shall be consistent with the size the conduit being installed, shall be steel electrogalvanized, and shall meet all environmental and seismic conditions.

2) Expansion couplings shall be weatherproof and approved for use indoors or outdoors without an external bonding jumper.

3) Expansion couplings shall be UL Listed and approved for use in wet locations.

4) Expansion couplings shall comply with UL 514B, CSA 22.2 No. 18 3-12, NEMA FB1.

d. Exterior raceways: PVC schedule 40 conduit at the minimum shall be utilized in all underground applications unless otherwise specified by related specification sections. The conduit shall be buried at a minimum 36" below grade. Warning flagging tape shall be buried 12" below grade to indicate the conduit routing location. Refer to related specification sections for additional requirements.

1) The Contractor shall have the option to utilize the same trench/routing location as other utilities. In no case shall any system conduits or duct banks be combined with other electrical utilities without providing the required separation between conduits as necessary to ensure the minimal transmission or conduction of any RF and/or EMI signals.

J. Penetrations of Walls and Floors:

1. Refer to specification Section 27 05 00 for additional information.

3.6 ELECTRICAL POWER DISTRIBUTION

A. Refer to specification Section 27 05 00 for additional information.

3.7 TRANSIENT VOLTAGE SUPPRESSION

A. Refer to specification Section 27 05 00 for additional information.

3.8 EQUIPMENT IDENTIFICATION

A. Refer to specification Section 27 05 00 for additional information.

3.9 MAINTENANCE AND SERVICE

A. Refer to specification Section 27 05 00 for additional information.

3.10 WARRANTY

A. Refer to specification Section 27 05 00 for additional information.

3.11 FIELD SERVICES

A. In addition to all testing requirements as specified by Division 01, Specification 27 05 00 as well as all related Division 27 Specification Sections, testing of all grounding and bonding functions shall be provided in accordance with the following requirements;

1. Notify the County in writing, prior to the closing of any ceilings and ten (10) days advance of testing all grounding and bonding connections to prevent delays in construction schedules.
2. Test all grounding and bonding conductors prior to start-up and commissioning of any, communications components, devices, equipment and/or systems.

B. Before requesting a final inspection, the contractor shall perform a series of end to end installation performance tests. The contractor shall submit for approval by the County all test procedures to be employed, test result forms, and timetable for testing all grounding and bonding connections.

C. Acceptance of the test procedures is predicated on the contractor's use of the specified products.

1. The grounding and bonding, of any sub-systems, system components, equipment, materials, and conductors shall be furnished and installed as herein specified as well as all related specification sections. All grounding and bonding shall be installed in accordance will the Contract documents, as well as all manufacturer’s recommended practices, applicable codes, standards and industry practices.

2. Acceptance of the completed installation for each system will be evaluated in accordance with the following factors;

   a. Phases of Testing:

      1) On-Site Performance Verification Testing

      2) On-Site Final Acceptance Testing

3. Test Plan/Procedure: Refer to specification Section 27 05 00 for additional information.

4. Test Reports: Refer to specification Section 27 05 00 for additional information.
5. Test Resolution: Refer to specification Section 27 05 00 for additional information.

D. At the minimum, the testing of all grounding and bonding connections to any hardware, materials, components, equipment and/or systems shall include the following requirements;

1. Test grounding system before grid trenches are back-filled. Test for ground resistance after installation of underground grid and grounding connections.
2. Install ground access test wells at locations as required for testing, using a pipe surrounding the rod and connections with a cover placed on top at grade level.
3. Test system resistance at each test well using "Fall of Potential" method Per IEEE Standard No. 81-1983) with a maximum resistance of 5 ohms.
4. Upon completion of the electrical system, including all grounding, the Electrical Contractor shall test the system for stray currents, ground shorts, etc. Approved instruments, apparatus, service, and qualified personnel shall be utilized. If stray currents, shorts, etc., are detected, eliminate or correct as required. The test procedure shall be as follows:

   a. Open all main disconnects for the system being tested.
   b. Disconnect the system neutral from the service entrance or step-down transformer neutral connection.
   c. Connect a DC ohmmeter across the system neutral and equipment ground.

      1) An ohmmeter reading in excess of 100 ohms shall indicate that the system neutral and equipment ground are properly isolated.

      2) An ohmmeter reading less than 100 ohms shall indicate that the system contains ground shorts (stray currents) at some point along the system neutral.

   d. Grounded neutrals may be identified by disconnecting individual neutral conductors from the system, one at a time, while monitoring the ohmmeter.
   e. The systems shall be re-tested after correction of all ground shorts is complete.

E. Performance Verification Testing

1. Complete operational testing of all grounding and bonding hardware, materials, components, equipment and/or systems shall be witnessed by the County.
2. Schedule test with the County. Do not begin testing until:

    a. All systems have been installed and individually and jointly tested to ensure they are operating properly.
    b. Written permission from the County has been received.

3. Testing: As part of performance verification, test all hardware, materials, components, equipment and/or systems grounding and bonding terminations. The tests shall demonstrate functional connections of all hardware, materials, components, equipment and/or systems.
4. Verification: Verify correct grounding and bonding connections and functionality as required of all systems as defined in all related specifications sections.
5. Adjustment, Correction, and Completion:

    a. Correct deficiencies and retest affected grounding and bonding components.
    b. Make necessary adjustments and modifications to all grounding and bonding installations after obtaining approval of the County.

        1) Completion: Performance verification test shall be complete when testing or retesting of each component has produced a positive result and has been approved in writing by the County.

6. Recording:

    a. Describe actual operational tests performed and equipment used and list personnel performing tests.
    b. Record in tabular form all test results, deficiencies, and corrective measures.

7. Termination

    a. Performance verification test shall be terminated by the County when:

        1) Individual systems, system components, subsystems, or cabling infrastructure fail to perform as specified.

        2) It is determined that a system or sub-system is missing any components or installation is not complete.

    b. Upon termination, corrective work shall be performed and performance verification test rescheduled with the County.
    c. Retesting shall be performed by Contractor at no additional expense.
    d. Contractor shall continue to perform corrective actions and retest until system passes all tests to satisfaction of the County.

3.12 TRAINING

A. Refer to specification Section 27 05 00 for additional information.

3.13 PROJECT CLOSEOUT REQUIREMENTS

A. Refer to specification Section 27 05 00 for additional information.

END OF SECTION

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, and all related Specification Sections, shall all apply to this Section.

B. Refer to Specification Section 27 05 00 for a complete list of related specification sections.

C. Reference Symbols:

1. All device symbols are defined by the appropriate symbol schedule on the symbols and abbreviations sheet in the systems drawing package. Not all device symbols indicated may be required for the project.
2. Due to the scale of the drawings, symbols are shown on drawings as close as possible to the mounting location. Contractor shall coordinate exact locations with all drawings and affected trades prior to submittal of shop drawings.
   a. The installing Contractor shall coordinate exact locations with all security and telecommunications drawings and site plan drawings as well as all affected trades prior to submittal of any shop drawings.

D. Abbreviations:

1. Refer to Specification Sections 27 05 00 for additional information.

E. Definitions:

1. Refer to Specification Section 27 05 00 for additional information.

1.2 SUMMARY

A. Refer to Specification Section 27 05 00 in addition to the following.

B. The intent of this specification is to establish a standard of quality, functionality, and features for the installation of an IP-based Television (IPTV) Distribution System throughout the entire new satellite concourse as indicated on the Contract Drawings and specified herein. The IPTV system shall distribute and display broadcast television content obtained from the Authority service provider, on video display monitors throughout the terminal. Should the Authority choose to select a different service provider prior to construction, the contractor shall coordinate with that provider. Additionally, the system shall be designed to support the services of a different service provider in the future.

C. It is the responsibility of the contractor to ensure that the installed system meets or exceeds every standard set forth in these specifications. The contractor shall provide all

TV outlets, conduits, fiber optic cabling and category 6 cabling as necessary to provide a complete and fully operational IP Master Antenna Broadcast Television (IPTV) distribution system.

D. Refer to Specification Sections 27 05 00 and 27 10 00 and for all TCP/IP based system cabling requirements.

E. The Contractor shall be responsible for providing all cabling, cable terminations, conduits/raceways, racks, cabinets, programming, commissioning, and testing of all network communications cabling in accordance with all related Division 27 Specification Sections.

1.3 REFERENCES

A. Refer to Specification Section 27 05 00 for requirements.

1.4 SYSTEMS DESCRIPTION

A. The IPTV system shall provide the display of broadcast/cable television channel feeds on selected flat panel display monitors in the satellite concourse. The system shall consist of IPTV tuner modules ("set top boxes") located at each IPTV display. Set top box make and model shall be as required by the Authority's service provider. Set top boxes shall obtain television content through the Local Area Network from the content provider's utility connection.

B. The terminal Local Area Network shall be configured to provide the appropriate routing and switching paths from the network service provider public wide area network (WAN) connection in the network to the set top boxes to be installed.

1.5 SUBMITTALS

A. Refer to Specification Section 27 05 00 for additional information.

1.6 QUALITY ASSURANCE

A. Refer to Specification Section 27 05 00 for additional information.

1.7 DELIVERY STORAGE AND HANDLING

A. Refer to Specification Section 27 05 00 for additional information.

1.8 RECORD DOCUMENTS

A. Refer to Specification Section 27 05 00 for additional information.

1.9 OPERATIONS AND MAINTENANCE

A. Refer to Specification Section 27 05 00 for additional information.

1.10 SOFTWARE AGREEMENT

A. Refer to Specification Section 27 05 00 for additional information.

1.11 SPARE MATERIAL

A. Refer to Specification Section 27 05 00 for additional information.

1.12 ENVIRONMENTAL CONDITIONS

A. Refer to Specification Section 27 05 00 for additional information.

PART 2 - PRODUCTS

2.1 MANUFACTURED PRODUCTS

A. Refer to Specification Section 27 05 00 for additional information.

2.2 SYSTEM REQUIREMENTS

A. The IPTV system shall support all channels made available by the service provider as part of the Authority's subscription, with the capability to support additional channels in the future (minimum of 64 channels).

B. The IPTV system shall meet the following audio/visual formatting requirements

1. Support a minimum of 1920x1080-pixlel full HD resolution at 60Hz refresh rate, as well as other standard resolutions including 480i, 480p, 720p, and 1080i.
2. Support for standard compression formats including, but not limited to MPEG-1, MPEG-2, MPEG-4 Part 10 (AVC/H.264), and others as specified by the service provider.

C. Images and audio shall be free from pixilation, artifacts, noise and other undesirable audible and visual aberrations.

D. All system components shall be fully interoperable and permit future upgrades via software or firmware update.

2.3 FIELD DEVICES

A. Video Displays

1. Authority shall furnish and Contractor shall install LED-backlit LCD flat displays as shown on the contract documents. Displays shall be commercial/professional-grade, rated for 24/7 use and meet the following requirements:

    a. Panel Size: 55" Class Diagonal – 16:9 widescreen aspect ratio.
    b. Bezel: 0.9mm or less
    c. Panel Technology: In-Plane Switching (IPS)
    d. Native Resolution: 1920 x 1080 pixels (Full HD)
    e. Brightness: 700 cd/m2
    f. Contrast Ratio: 1400:1
    g. Dynamic Contrast Ratio: 500,000:1
    h. Viewing Angle (Degrees): 178H x 178V
    i. Color Depth: 1.06 Billion colors
    j. Response Time (Gray-To-Gray, Black & White): 8ms
    k. Duty Cycle: 24-7 Continuous Use
    l. Orientation: Portrait or Landscape
    m. Inputs: HDMI, DisplayPort, DVI-D, OPS, Analog RGB, RS-232C, RJ-45, USB3.0/2.0
    n. HDTV Formats: 720p, 1080i, 1080p
    o. Outputs: DisplayPort (1.2a/HDCP 1.3), audio, RS-232C, RJ-45
    p. Integrated Network/USB Media Player
    q. Remote Monitoring and Control GUI
2. Display shall be model 55VH7B as manufactured by LG or approved equal.

B. Set-Top Boxes

1. Authority shall furnish and Contractor shall install an IPTV set-top box tuner for each LCD television monitor. IPTV tuners shall meet the following requirements:

    a. AES 128/256 decryption capable.
    b. Support of network video-on-demand.
    c. Support for MPEG-1/2/4, H.264 and HD IPTV streams.
    d. IR remote control.
    e. Serial RS-232 control.
    f. HDMI video output.
    g. All service provider / carrier requirements.
    h. Mounting Hardware
2. Coordinate with the Authority and OAR for exact mounting locations of all LCD television monitors. Furnish and install mounts listed for the application and with sufficient load-bearing capacity to support the selected television monitors. Refer to the Contract Drawings for additional information.

C. Standard Mounts

1. Mounts shall meet the following requirements at a minimum:

a. Support 40" – 65" displays
b. Back-to-back mounting for (2) displays
c. Concealed mounting area for media player / set-top box equipment
d. Maximum Capacity: 300lb / 136kg
e. Mount shall be Peerless-AV model #DST965 or approved equal.

2.4 HARDWARE REQUIREMENTS

A. General

1. The IPTV, as defined in this document, shall include all configured hardware necessary to provide a complete and functional system. The Contractor shall supply all patch cables, power cords, displays, display mounting and attachments and video extension and processing equipment necessary to interconnect all system hardware.
2. All hardware and materials shall be new.
3. The hardware selected shall be standardized to maintain uniformity, warranty and spares optimization for the IPTV program.

B. IPTV hardware products shall include, but not be limited to:

1. 46/48" LCD Video Displays:

   a. Basis of design manufacturer: NEC Displays

      1) NEC P463 commercial Grade 24/7
      2) NEC P484 commercial Grade 24/7

2. Additional LCD Video Display sizes:

   a. TBD

3. Headend with TV signal Encoders/Decoders:

   a. TBD

4. Video display mounting and attachment brackets:

   a. Basis of design manufacturer: Peerless

      1) Pop-out
      2) Tilt

5. Power Supplies:

   a. TBD

6. Power Inserter:

a. TBD

7. Head End Signal Splitters:

a. TBD

8. Directional Couplers:

a. TBD

9. Combiners:

a. TBD

10. Passive Taps:

a. TBD

11. Amplifiers:

a. TBD

12. L Band Amplifiers:

a. TBD

13. Antennae:

a. TBD

14. Satellite Receivers:

a. TBD

15. Multi-switch:

a. TBD

16. IP Video Encoder:

a. TBD

17. Set Top Boxes with ATSC Tuner with HDMI Outputs:

a. TBD

18. HDMI Processors:

a. TBD

19. Fiber Optic Transceivers:

a. TBD

20. Coaxial Cable Types:

a. RG-6

1) TBD

b. RG-11

1) TBD

c. TBD

PART 3 - EXECUTION

3.1 COORDINATION

A. Refer to Specification Section 27 05 00 for additional information.

3.2 IPTV Programming and Content

A. The Contractor shall obtain from the County a list of TV signal resources and programming contents for the propose of presenting suitable contents for public viewing in an airport environment.

3.3 EQUIPMENT PROTECTION

A. Refer to Specification Section 27 05 00 for additional information.

3.4 WORK PERFORMANCE

A. Refer to Specification Section 27 05 00 in addition to the following:

B. Refer to related specification sections for additional project coordination requirements. In addition to the requirements defined in this specification section, the contractor shall coordinate and meet all requirements addressed in Division 26, Division 27 and Division 28 specification sections.

C. The Contractor shall provide all end-user cabling and connectivity components for interconnection of system equipment. This shall consist of, but not be limited to:

1. The installation of hybrid fiber optic/copper cabling from communications rooms (IDFs/MDFs) to all data outlets supporting IPTV set top boxes.
2. The installation of data outlets.
3. The installation of Category 6 UTP patch cords for interconnection from data outlets to set top boxes.
4. The installation of multimode, single mode fiber optic and Category 6 UTP patch cords in communications rooms to connect equipment associated with the IPTV system.

3.5 EQUIPMENT INSTALLATION

A. All system equipment installations shall be in accordance with good engineering practices, NEC, local building codes, and all manufacturer's requirements. Cable terminations at all equipment locations shall comply with all state and local electrical codes. All wiring shall test free from all grounds, shorts, stray voltages and EMI.

B. In addition to all demonstration and training as specified by Division 01, Specification Section 27 05 00 and related Division 27 Specification Sections, system installation shall be provided in accordance with all requirements of this Section.

C. General

1. System/Hardware and mounting must comply with IBC Seismic Requirements. Where undefined by codes and standards, Contractor shall apply a safety factor of at least 2 times the rated load to all fastenings and supports of system components.

3.6 COMMUNICATIONS CABLING REQUIREMENTS

A. Refer to Specification Section 27 05 00 for additional information.

3.7 ELECTRICAL POWER DISTRIBUTION

A. Refer to Specification Section 27 05 00 for additional information.

3.8 TRANSIENT VOLTAGE SUPPRESSION

A. Refer to Specification Section 27 05 00 for additional information.

3.9 GROUNDING AND BONDING

A. Refer to Specification Section 27 05 00 for additional information.

3.10 EQUIPMENT IDENTIFICATION

A. Refer to Specification Section 27 05 00 for additional information.

3.11 MAINTENANCE AND SERVICE

A. Refer to Specification Section 27 05 00 for additional information.

3.12 WARRANTY

A. Refer to Specification Section 27 05 00 for additional information.

3.13 FIELD SERVICES

A. Refer to Specification Section 27 05 00 for additional information.

3.14 TRAINING

A. Refer to specification Section 27 05 00 for additional information.

3.15 PROJECT CLOSEOUT REQUIREMENTS

A. Refer to specification Section 27 05 00 for additional information.

END OF SECTION

PART 1 - GENERAL

1.1 STIPULATIONS

A. Refer to Specification Section 27 05 00 in addition to the following.

B. Drawings and general provisions of the Contract, including Division 00 and Division 01 Specification sections apply to this Section.

C. Related Specification Sections:

1. Refer to Specification Section 27 05 00 for a complete list of related specification sections.

D. Reference Symbols:

1. Refer to Specification Section 27 05 00 for requirements.

E. Abbreviations:

1. Refer to Specification Section 27 05 00 for requirements.

F. Definitions:

1. Refer to Specification Section 27 05 00 for requirements.

1.2 SUMMARY

A. Refer to Specification Section 27 05 00 in addition to the following.

This section includes the requirements for provision and installation of Structured Cabling System including Outside Plant (OSP) backbone cabling and pathways, comprised of voice and data subsystems for the satellite concourse.

1.3 REFERENCES

A. Refer to Specification Section 27 05 00 for requirements.

1.4 SYSTEM DESCRIPTION

A. Furnish and install a complete Structured Cabling System including Outside Plant (OSP) backbone cabling system, including all necessary tools, materials, equipment, labor, and testing, to create a dynamic multi-product, vendor-agnostic environment including all cable, equipment, materials, and labor as required to provide, install and test a complete system. This system shall enable all County low voltage systems to be fully operational according to design specifications at project completion, complying with these specifications and all regulatory requirements. The system shall include but not be limited to:

1. Backbone Cabling: Fiber and copper cabling including inside and outside plant installations as required. All fiber and copper voice/data/systems cabling necessary for a complete and fully operational Structured Cabling System.
2. Backbone Pathway: Conform to ANSI/TIA-569D – 2015 using conduit, cable tray, backboards, etc. as indicated.
3. Outside Plant backbone cabling. To include buried conduit/duct bank cable and pathways as specified in project.
4. Intra-building pathways shall be installed so Main Communication Rooms are fed to Intermediate Distribution Frame (IDF) Rooms in combination star and ring

configuration or dual star configuration connecting IDF Rooms to the Main Communications Rooms.

5. Horizontal Pathway: Conform to ANSI/TIA-569D – 2015 using conduit, cable tray, backboards, cabinets, etc. as indicated. All cable is to be installed in conduit unless approved otherwise by County in writing as a response to a written request by a member of the Design/Project Team.
6. All references to cable installations within this document include complete installation specifications, including but not limited to: "installed, terminated, tested and administered".
7. All references to testing include complete testing procedures, including but not limited to: "results are to be recorded in the test device, printed and submitted in hardcopy and in electronic format". See details on testing.
8. Horizontal Cabling: Complete from Structured Cabling System Equipment to each outlet using cable (copper or fiber optics) as specified.
9. Outlets: Provide outlets as required. All cabling whether fiber optic or copper installed terminated and tested.
10. Raceways, outlet boxes, cabinets, identification, etc.: Conform to applicable sections in Division 26 and 27 specifications.
11. Cabinets and racks: Conform to applicable sections in these specifications.
    a. All cabinets shall have internal vertical and horizontal cable management panels.
    b. All racks shall have cable management components.
    c. Cabinet and rack installations shall have overhead cable tray installed.
    d. All cabinets shall have vented front doors, split vented rear doors, and vented side panels for adequate airflow for proposed equipment to be installed.
    e. All cabinets shall have locking front and rear doors.
    f. All cabinets and racks shall be furnished with a vertical rack bonding busbar.
12. Patch panels - Provide and install the required patch panels for fiber optic cables and copper cables. All fiber optic patch panels to have locking metal framed or metal covers with hasps (front and rear) for a padlock.
13. Surge suppression shall be provided on all cables entering or leaving the footprint of the building or exterior device subject to surge. See below section for additional surge suppression requirements.
14. Fireproofing equivalent to a one-hour rating shall be provided on all communications room penetrations.
15. Systems rooms overhead cable trays: all cable trays shall be mounted per manufacturers specifications complete with all hardware and rubber boots on ends. Corner or T-sections shall be provided with corner bracket sweep or a bend section.
16. All cable trays shall be a minimum of 12 inches from any source of EMI or other sources of electrical interference. The Contractor shall follow industry standards and best practices in maintaining proper separation from EMI and other sources of electrical interference.
17. All racks or cabinets shall be installed with overhead fiber optic trough system with an open channel design to protect and route fiber optic patch cords. Trough shall have downspouts and drop-outs over each rack side. Refer to drawings for side of ladder rack that fiber optic trough system shall be installed on.
18. All locations that have Fiber Optic (FO) or copper cabling mounted on Communication

Room walls shall have overhead cable ladder rack and overhead fiber optic trough system with an open channel design to protect and route fiber optic patch cords installed from any new racks or cabinets to wall or other existing rack(s) to create cable pathways. In addition, Communications Room walls shall have D-rings and/or other vertical and horizontal cable management to support cabling. Zip ties shall not be used as cable management.

19. All under floor cable pathways shall be completed as described above providing cable pathways between components, using under-floor system.
20. Transition pans with dividing fingers shall be furnished and installed on ladder rack above racks and equipment cabinets in quantities and locations as necessary to properly support and route copper cables and patch cords, including patch cords installed by County. Transition pans shall match racks (black) in color and be provided by the same manufacturer as the rack.
21. Backbone cable shall be secured by hook-and-loop (Velcro) cable ties on overhead rack and into fiber optic patch panels.
22. Backbone cables shall not be broken out of the cable jacket except within enclosures designed to protect and support cable breakouts.
23. All horizontal fiber and copper, and patch cords cable shall be secured by black Velcro wrap as necessary.
    a. Velcro wrap shall be cut from 1 inch by 10-yard roll (industry standard supply) for cable bundles.
    b. Individual black Velcro cable ties may be used where appropriate.
    c. Velcro cable ties shall be solid black without any manufacturers name, logo, or other imprinted on wrap.

B. Coordinate all work related to equipment provided by the Owner and/or Owner's vendor(s).

1. Where new telephone, network, and other systems equipment provided by County is to be installed as a requirement in project, a systems meeting is required with the County no longer than three (3) weeks after Notice-To-Proceed is issued and thereafter on a monthly basis.
2. Monthly Systems meetings are required as necessary for successful coordination and completion of Owner provided equipment.

C. Provide all power, grounding, plywood backboards and complete raceway system. Refer to Division 26 for power and grounding requirements.

D. Complete Telecommunication Infrastructure element labeling according to ANSI/TIA 606 and County requirements as specified in this document.

1. Labeling format samples and required Telecommunication Infrastructure Record Administration forms are included in this specification document.
2. All Infrastructure Element labeling shall be complete and Telecommunications Infrastructure Administration Records shall be submitted prior to the infrastructure being put into use, at the same time all cable test records are submitted.

E. Completion of the PDS and OSP cabling system in its entirety is required by Substantial Completion inspection, including submission of system test report documents.

1. If County provided or Contractor provided equipment requires the use of systems cabling infrastructure to have any Electronic Systems operational for the project to

meet Substantial Completion inspection requirements the cabling infrastructure shall be complete and tested in its entirety according to a previously coordinated schedule providing reasonable and adequate time for Electronic Systems to be installed, tested and made operational.

2. No cabling infrastructure is to be put into use without being complete and fully tested according to these and Project Engineering specifications.

F. Where any active Electronic Systems are installed by any party requiring installation of fiber or copper patch cords, all patch cords shall be permanently and properly routed in the pathway created for same, and the patch cords shall be labeled on each end with source/destination..

1.5 SUBMITTALS

A. Refer to Specification Section 27 05 00 in addition to the following.

B. Product data shall be submitted on all products used to complete the scope of work of this project, including but not limited to:

1. Catalog cut sheets.
2. Roughing-in diagrams
3. Proof of UL Listing. Indicate the UL listing, the UL classification, and NEC insulation type used for each type of cable to be used in installation of the Structured Cabling System. Provide a complete copy of the UL Test report substantiating that the cable meets ANSI/TIA requirements.
4. UL Verification of Category 6 and 6A equipment and material.
5. Installation instructions. Indicate application conditions and limitations of use stipulated by product testing agency. Include instructions for storage, handling, protection, examination, preparation, and installation.
6. Manufacturers Certificate: Certify that products meet or exceed specified requirements.
7. Test results from manufacturer showing product has passed quality control tests at factory (specifically fiber optic cabling, as well as other applicable products.
8. Submit test reports from manufacturers', specifications and any other information necessary to determine compliance with material and equipment specified.
9. Operation and maintenance manuals.

C. Shop Drawings: Submit plan of building(s) and site showing pathways with all installed cables and pathways noted.

1. Shop Drawings for enclosures shall include plans, elevations, sections, and attachment details indicating sizes of equipment, their relationship, and clear space within the enclosure.
2. Detailed floor plan layouts and riser diagrams showing system components and their location, interconnections, wiring/cabling, and interface and connection with other disciplines.
3. Coordination Drawings in accordance with the requirements of Division 01.
4. Detailed data as requested by the County.
5. Point to point wiring diagrams and block diagrams of system to be installed.
6. Submit a detailed step by step testing procedure for any active components, component/ system functional checkout and test.

7. Coordination: Shop drawing plans shall include pathway routing, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of items involved:
   a. Structural members in paths of pathway groups with common supports.
   b. HVAC and plumbing items and architectural features in paths of conduit groups with common supports.

D. Detail drawings of each of the facilities' terminal boards/cabinets, and equipment rack elevations for all MDF and IDF locations.

E. Qualifications: Submit qualifications of system installer including but not limited to:

1. Contractor's license.
2. A list of a minimum of three (3) recently completed PDS projects of similar type and size with contact names and telephone numbers for each that the Contractor has performed within the last two (2) years.
3. Documentation of the Contractor's staff member(s) who are BICSI Certified Installation Technicians. The documentation shall be current copies of the certificate issued by BICSI.
4. A letter certifying the Contractor maintains an office within fifty (50) miles of the project location.
5. Proof of certification by the manufacturer(s): Documentation that the Contractor is an authorized and designated installer for the equipment manufacturers whose products he intends to install.
6. Technical resume of the Contractor's Project Manager and Field Supervisor documenting a minimum of five (5) years' experience installing Structured Cabling Systems.
7. Technical resume for any sub-contractor who will assist the PDS Contractor in performance of this work.
8. A list of test equipment proposed for use.
   a. For testing copper or metallic cabling components.
   b. For testing fiber optic cabling components.
   c. Include test certificate verifying that all test instruments have been calibrated by a factory authorized service agent within 12 calendar months immediately preceding the date of submittal.
   d. All testing equipment/instruments shall be manufactured by a company engaged in the manufacturing of test equipment specifically designed for the purposes specified herein. Test equipment required to satisfy the testing requirements of this project shall have been available for purchase from the submitted manufacturer for at least five consecutive years immediately preceding the submittal date.
   e. All test equipment/instruments submitted and used to satisfy the testing requirements of this project shall be current models manufactured by the submitted manufacturer. The equipment/instruments shall be currently in production at the time of submittal and fully supported by the manufacturer.

1.6 QUALITY ASSURANCE

A. Refer to Specification Section 27 05 00 for requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Refer to Specification Section 27 05 00 for requirements.

1.8 RECORD DOCUMENTS

A. Refer to Specification Section 27 05 00 in addition to the following.

B. As-Built documents shall include updating and revising contract documents to record actual locations (as-installed) of all equipment, pull boxes, devices, IDF's, raceways, cabling, Telecommunication Outlets, and all Premise Distribution and all Outside Plant cable infrastructure components.

C. As-Built PDS and OSP riser diagrams shall be submitted.

D. All drawings required herein shall be in AutoCAD Latest Release or format required by Division 01 specifications.

E. Drawings required herein are in addition to those required under "OPERATION AND MAINTENANCE DATA."

F. Telecommunication Outlet label information sheet: An E size sheet(s) copy of the Electrical, Power or Systems project plan sheet that shows all Telecommunication outlets in office/building spaces with all TO final label information typed in by each TO symbol in each room shall be submitted to the County. This document shall be submitted by Substantial Completion Inspection or earlier. This sheet is required a minimum of three weeks prior to any need to have any voice/data jacks to be made active for any purpose.

1.9 OPERATION AND MAINTENANCE

A. Refer to Specification Section 27 05 00 in addition to the following.

B. O & M Manuals shall include:

1. A complete as-installed equipment list of active (powered) components, including Owner Furnished Equipment. Equipment shall be listed by room, with manufacturers' names, model numbers, serial numbers, and quantities of each item.
2. A complete and correct system schematic, showing detailed connections for all parts of the system, including cable numbers, terminal block numbers and layouts, and other designations and coding's (point-to-point wiring diagrams). System performance measurements shall be documented as noted elsewhere in this specification.
3. Riser diagrams showing as-installed conduit with pull boxes, outlet boxes, physical cable layouts, part numbers of cable types used, and number of circuits in each conduit.
4. Repair parts list for each major equipment item furnished.
5. A list of spare repair parts provided by the Project with a copy of the Transmittal Sheet showing who took receipt of and where the spare parts are stored.
6. Service manuals for each major equipment item furnished.
   a. Manual(s) shall be bound separately and labeled appropriately.
   b. Include instructions for adjusting, operating, and extending the system
   c. Manufacturer's warranties and operating instructions for each active equipment item furnished.

d. Recommended preventive maintenance procedures.

7. Test Data: record of results for all copper, metallic, and fiber optic cables installed and tested, or tested.
   a. Test data shall be formatted according to ANSI/TIA 606 Administration Standards.
   b. Test results shall be submitted in hard copy in three (3) ring binder and in electronic form (CD).
   c. Include all fiber tests with performance graph from OTDR. Single Mode and Multi-Mode shall be OTDR tested. All fiber utilized for the installation of Project Systems required by the project scope shall be tested whether or not the cable was installed by the Contractor.
8. Data sheets showing all field labeling used for termination blocks, and cable (outside plant, backbone, riser and horizontal) runs.
9. Cable Data for all backbone (riser) and horizontal fiber and copper indicating type and use of cable installed by Contractor and to include:
   a. Manufacturer's specification sheet.
   b. Manufacturers performance and warranty sheet.
   c. Date manufactured.
   d. Part number.
   e. Serial number.
   f. Reel number.
   g. Description.
   h. Attenuation specifications.
   i. Bandwidth specifications.
10. Complete equipment rack/cabinet layouts showing locations of all rack mounted patch panels, and equipment items.

1.10 SOFTWARE AGREEMENT

A. Refer to Specification Section 27 05 00 for requirements.

1.11 SPARE MATERIAL

A. Refer to Specification Section 27 05 00 for requirements in addition to the following.

B. Patch Cables – Category 6 Copper: Furnish spare CAT6 patch cables in a quantity equal to the number of terminated CAT6 patch panel ports in communications spaces (MDF/IDFs). Furnish an equal number of each of the following lengths (in meters): 1, 2, 3, 4, 5, 6, 7, 8 9, 10.

C. Patch Cables – Multimode/Singlemode Fiber: Furnish spare fiber patch cables in a quantity equal to the number of terminated fiber patch panel ports in communications spaces (MDF/IDFs). Furnish an equal number of each of the following lengths (in meters): 1, 2, 3, 4, 5, 6, 7, 8 9, 10.

1.12 ENVIRONMENTAL CONDITIONS

A. Refer to Specification Section 27 05 00 for requirements.

1.13 SUBSTANTIAL COMPLETION INSPECTION REQUIREMENTS

A. Refer to Specification Section 27 05 00 in addition to the following.

B. These Substantial Completion requirements are additional to Drawings and general provisions of the Contract, including Division 00 and Division 01 Specification sections apply to this Section.

C. The Substantial Completion inspection shall cover all locations where PDS components and/or Systems have been installed and/or modified.

D. The Substantial Completion inspection shall be coordinated by the Contractor, and the County.

E. A separate PDS and Systems inspection may be requested by the County.

F. All cabling testing and labeling shall be completed by Substantial Completion Inspection, or prior to being put into service, whichever comes first.

G. All cabling test results' documents shall be submitted to the County.

H. All labeling documents shall be submitted to the, with a copy to the County.

I. If Owner provided or Contractor provided equipment requires the use of systems cabling infrastructure to have any Electronic Systems operational for the project to meet Substantial Completion inspection requirements the cabling infrastructure shall be complete and tested in its entirety according to a previously coordinated schedule providing reasonable and adequate time for Electronic Systems to be installed.

J. Where any active Electronic Systems are installed by any party requiring use of fiber or copper backbone or horizontal cables, the installation of fiber or copper patch cords shall be complete; all patch cords shall be permanently and properly routed in the pathway created for same, and the patch cords shall be labeled on each end with source/destination. must be demonstrated as complete by Substantial Completion inspection.

K. Where new or expansion Systems are installed using new or existing backbone or horizontal fiber strands, and other new or existing fiber strands becomes unused, all strands that became unused shall have their corresponding patch cords removed along the entire fiber cable route. All User ID cards information shall be erased or covered with white adhesive paper to indicate those strands are no longer in use. Marking out fields in User ID cards is prohibited. This shall be demonstrated during Substantial Completion inspection.

L. Telecommunication Outlet-to-Label space information sheet shall be provided:

1. An E size sheet(s) copy of the Power or Systems project plan sheet that shows all Telecommunication Outlets (TO) in office/building spaces, that has all TO final label information typed in by each TO symbol in each room is to be submitted to the County.
2. Two copies shall be submitted to the County.
3. This document shall be submitted by Substantial Completion Inspection or earlier. This sheet is required a minimum of three weeks prior to any need to have any voice/data jacks, dry pairs, or any outlet to be made active for any purpose.

PART 2– PRODUCTS

2.1 GENERAL

A. All equipment shall be new and unused. All components and systems shall be designed for uninterrupted duty. All equipment, materials, accessories, devices, and other facilities covered by this specification or noted on the contract drawings shall be the best suited for the intended use and a single manufacturer shall provide component assemblies.

B. Provide all components, equipment, parts, accessories and associated quantities required for complete installations and according to Manufacturers installation specifications. All components may not be specified herein.

C. All devices/components/products shall be suitable for use intended, and meet all stated performance requirements for PDS, OSP and Systems configurations specified in this document.

2.2 PATHWAYS/CONDUIT/RACEWAYS

A. General:

1. All pathways (conduit, raceways, wireways, pullboxes, outlet boxes, etc.) shall comply with applicable requirements of sections within these specifications.
2. All pathways (conduit, raceways, wireways, pull boxes, outlet boxes, etc.) shall comply with all requirements of ANSI/TIA-569D-2015.
3. Size: All horizontal pathways shall be minimum 1" conduit. Pathways shall be increased in size to properly accommodate number of cables to a maximum of 24 cables. Backbone conduits shall have at least 20% of installed innerduct pathways spare.
4. All conduits shall be sized and installed per NEC and ANSI/TIA specifications for intended use.
5. Size: All backbone conduit shall be a minimum 2" conduit.
6. Long Radius (sweep) bends shall be used for all fiber optic cable pathways, sized per NEC and ANSI/TIA specifications for intended use.
7. No pathway components shall be installed that force cables to exceed manufacturer's recommended bend radius during installation or when pulling of cable is complete.
8. For all horizontal pathways, there shall be no more than 180-degrees of total bend between any two pull points.
9. Pull-boxes shall not be used as direction changes but be used to pull straight through.
10. Where a pull-box is required with raceway(s) smaller than 1-1/4 trade size, an outlet box may be used as a pull-box.
11. Where a pullbox is used with raceway(s) of 1-1/4 trade size or larger, the pull box shall:
    a. Have a length of at least 8 times the trade size diameter of the largest raceway.
    b. Be individually labeled and installation location marked on As-Builts.
12. Metal flexible conduit shall not be used for PDS system.
13. Protective bushings: All backbone and horizontal conduits shall have plastic/nylon insulating bushings installed on all ends to protect cable.
14. All backbone and horizontal conduits shall have ground bonding bushings with lugs installed on ends that terminate in a communications room and be bonded to the Systems Ground Bus Bar with an insulated #6 AWG wire.
15. All conduit shall be labeled with source/destination at each end, and each main pull

box.

16. Pull Cords/Pull Tape: Install pull cords in all raceway runs including conduit and inner-ducts that are installed without cable (empty). Install a pull string or pull rope in all horizontal and backbone conduits and inner-ducts that have cable installed (used).
17. Boxes:
    a. All outlet boxes, junction boxes, pull boxes, etc. shall comply with applicable sections of these specifications.
    b. Outlet boxes shall be deep with a minimum size of 4-11/16" by 4-11/6" by 2-1/8" deep with a single gang sheetrock ring.
    c. Boxes shall be sized as required by ANSI/TIA and NEC for cables, both fiber and copper (metallic), conduit and/or device installed.

B. Rigid Steel Conduit:

1. Conduit shall be seamless, hot dipped galvanized rigid steel.
2. Threads shall be cut and ends chamfered prior to galvanizing.
3. Galvanized to provide zinc coating fused to inside and outside walls of conduit.
4. Provide an enamel lubricating coating on the inside of the conduit.
5. Conduit shall conform to ANSI C80.1 and listed and labeled under UL 6.

C. Rigid Aluminum Conduit:

1. Conduit shall be seamless, 6063 alloy, T-1 temper.
2. Conduit shall conform to FS WW-C-581d, ANSI C80.1, and UL 6.
3. Pass bending, ductility, and thickness of zinc coating in ANSI C80.1.

D. Intermediate Metal Conduit:

1. Conduit shall be seamless, hot dipped galvanized rigid steel.
2. Threads shall be cut and ends chamfered prior to galvanizing.
3. Galvanizing shall provide zinc coating fused to outside walls of conduit.
4. Provide an enamel lubricating coating on the inside of the conduit.
5. Conduit shall be listed and labeled under UL 1242.

E. Electrical Metallic Tubing (EMT):

1. EMT fittings shall be formed steel compression ring type. Die cast fittings are not allowed.
2. EMT shall be UL listed and conform to NEC Article 300.22.
3. Shall be used inside buildings only.
4. Only manufactured fittings, transition adapters, terminators and fixed bends shall be used.
5. All transition junction and pull boxes, fittings terminators and adapters shall be a metallic material.

F. Raintight Sealing Hubs:

1. Two piece type with outer internally-threaded hub to receive conduit, inner locking ring with bonding screw, insulated throat, and V shaped ring or O-ring.
2. Manufacturers: Thomas & Betts H series or Bridgeport.

G. Conduit Bodies: Not Permitted.

H. Conduit Fittings:

1. All fittings shall be compression or threaded.
2. Fittings shall provide a secure connection for pulling communications cables.
3. Setscrew fittings are not permitted.
4. ANSI/NEMA FB 1; material to match conduit.
5. Couplings for rigid steel conduit and IMC to be single piece threaded, cadmium plated malleable iron.
6. Couplings for rigid aluminum conduit to be of aluminum construction, 6063 alloy.
7. Hubs for box connection to be two-piece with outer internally threaded hub to receive conduit and inner locking ring with bonding screw.
8. Expansion fittings shall allow for a minimum of four inches of movement and shall be similar to O-Z Gedney AX series, complete with bonding jumpers and hardware.

I. Non-metallic conduits are not permitted in above ground installations. Conversion fittings are required for non-metallic (below ground) to metallic (above ground) transitions.

J. Innerduct:

1. Application: Suitable for an indoor or duct bank installation within a riser system or backbone conduit for the support of telecommunications fiber optic cables.
2. Material, as specified on drawings for each application:
   a. Multi-cell flexible fabric.
   b. 3-cell flexible fabric or greater, as indicated on the drawings, for duct bank installation.
   c. 3-cell flexible fabric, riser rated, for indoor installation.

K. Pull Cord / Pull Tape:

1. Pre-lubricated, woven polyester, low friction, and high abrasion resistant yarn.
2. Minimum average tensile strength shall be 1250 lbs. for 2 inch and smaller conduits and innerduct.
3. Minimum average tensile strength shall be 1800 lbs. for conduits larger than 2 inches.

L. Pull Boxes, Junction Boxes, and Gutters:

1. All junction boxes, gutters and pull boxes shall comply with NEC Article 314.

2. All junction boxes, gutters and pull boxes shall meet the following minimum material requirements:
   a. 16-gauge steel or heavier.
   b. Seams shall be continuously welded and grounded smooth.
   c. External screws and clamps.
   d. External mounting feet (where possible).
   e. Oil-resistant gasket and adhesive.
   f. ANSI 61 gray polyester powder coating inside and out over phosphatized surface.
   g. UL 50 type 12.
3. All junction boxes, gutters and pull boxes shall be provided with bushings for conduits and/or cabling.
4. All junction boxes shall be provided with a hinged cover. Where clearances do not allow full opening of hinged cover, bolt on covers with captive nuts shall be provided.
5. All junction boxes, gutters and pull boxes shall be securely installed.

6. All junction boxes, gutters and pull box configurations and sizes for single and multiple conduit runs shall comply with ANSI/TIA 569.

M. Metal Wireways and Auxiliary Gutters:

1. Description: Sheet metal, complying with UL 870 and NEMA 250, Type 1 unless otherwise indicated, and sized according to NFPA 70.
   a. Metal wireways installed outdoors shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
   b. Comply with TIA-569-B.
2. Fittings and Accessories: Include couplings, offsets, elbows, expansion joints, adapters, hold-down straps, end caps, and other fittings to match and mate with wireways as required for complete system.
3. Wireway Covers: Hinged type unless otherwise indicated.
4. Finish: Manufacturer's standard enamel finish.

N. Boxes, Enclosures, and Cabinets:

1. General Requirements for Boxes, Enclosures, and Cabinets:
   a. Comply with TIA-569-B.
   b. Boxes, enclosures and cabinets installed in wet locations shall be listed for use in wet locations.
2. Sheet-Metal Outlet and Device Boxes: Comply with NEMA OS 1 and UL 514A.
3. Box extensions used to accommodate new building finishes shall be of same material as recessed box.
4. Small Sheet Metal Pull and Junction Boxes: NEMA OS 1.
5. Device Box Dimensions: 4-11/16” inches by 4-11/16” inches by 2-1/8 inches deep with mud ring.
6. Gangable boxes are not allowed.
7. Nonmetallic Outlet and Device Boxes: Comply with NEMA OS 2 and UL 514C.
8. Cabinets:
   a. NEMA 250, Type 1, galvanized-steel box with removable interior panel and removable front, finished inside and out with manufacturer's standard enamel.
   b. Hinged door in front cover with flush latch and concealed hinge.
   c. Key latch to match panelboards.
   d. Metal barriers to separate wiring of different systems and voltage.
   e. Accessory feet where required for freestanding equipment.
   f. Nonmetallic cabinets shall be listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

O. Handholes and Maintenance Holes for Exterior Underground Cabling:

1. General Requirements for Handholes and Maintenance Holes:
   a. Handholes and maintenance holes for use in underground systems shall be designed and identified as defined in NFPA 70, for intended location and application.
   b. Comply with TIA-569-B.
2. Polymer-Concrete Handholes and Maintenance Holes with Polymer-Concrete Cover: Molded of sand and aggregate, bound together with polymer resin, and reinforced

with steel, fiberglass or a combination of the two.

a. Refer to drawings for handhole and maintenance hole sizes.
b. Standard: Comply with SCTE 77.
c. Configuration: Designed for flush burial with closed bottom unless otherwise indicated.
d. Cover: Weatherproof, secured by tamper-resistant locking devices and having structural load rating consistent with enclosure and location.
e. Cover Finish: Nonskid finish shall have a minimum coefficient of friction of 0.50.
f. Cover Legend: Molded lettering, "Communications".
g. Conduit Entrance Provisions: Conduit-terminating fittings shall mate with entering ducts for secure, fixed installation in enclosure wall.
h. Handholes and maintenance holes 12 Inches Wide by 24 Inches Long and Larger: Have inserts for cable racks and pulling-in irons installed before concrete is poured.

2.3 TERMINATION BACKBOARDS

A. Material: 3/4" A/C grade, Class A Flame Spread plywood.

B. Size: 8' high by 4' wide with multiple sections as shown drawings, unless otherwise noted or required in these specifications.

C. Finish: Paint terminal board with gray paint having a flame spread rating of Class A as a minimum. Do not paint over Class A flame spread information on plywood.

D. Install label on backboard with TTB# and Room#.

2.4 "SYSTEMS" AND "LOCAL" GROUND BUS

A. Ground Bus shall be copper and comply with applicable sections of these specifications.

B. Install minimum one copper ground bus with qty (12) pre-drilled 1/4" holes on isolating stand-offs of TTB backboard. Holes shall be configured to accept two-hole lugs.

C. Basis of Design: Chatsworth #10622-012 or approved substitution.

2.5 COMMUNICATION ROOMS AND SIMILAR SPACES

A. With the exception of cable management devices and rack/cabinet equipment below, devices shall be installed per requirements determined in the field by the Project Engineer and Contractor as required to neatly dress/organize cables in and out of rack/cabinets.

B. No metallic or fiber cables shall be unsupported, or potential patch cord routes be without a supported pathway.

C. Fiber optic patch cable pathways shall be routed and specifically constructed for protective fiber cable routing.

2.6 FLOOR MOUNT EQUIPMENT RACKS/CABINETS

A. Standard open racks (2-post):

1. Universal self-supporting all aluminum rack 84" H. x 19" W. x 3" D.
2. Standard for 19" rack mounted equipment.
3. Standard 3" x 1.25" aluminum upright channels, .125" thick.

4. Have mounting holes both sides (front and rear) of upright channels.
5. Panel Mounting Holes: #12-24 rolled threads in 5/8" - 5/8" x 1/2" hole pattern meeting ANSI/TIA-568 mounting space requirements.
6. Use heavy-duty assembly hardware.
7. Provide isolation pad between rack and floor.
8. Base Angles: 3-1/2" x 6" x 3/8" thick (pair) for bolting to floor with 3/8" expansion anchors.
9. Top Cross-Angles: 1-1/2" x 1-1/2" x 1/4" (pair).
10. Finish: Black.
11. All rack equipment mounting screws to be black clean thread type.
12. Rack Basis of Design: Chatsworth.
13. Acceptable substitutions:
    a. Homaco.
    b. Hubbell.

B. Cabinets:

1. Cabinets shall be sized according to Project design to meet the requirements of active and passive equipment that may be installed inside each cabinet.
2. Cabinets shall house all active electronics and meet the following minimum requirements:
    a. All cabinets, if installed in a contiguous fashion, shall have an inter-cabinet pathway installed at the top of cabinets for patch cables following ANSI/TIA guidelines for patch cord cable management.
    b. All cabinets shall have internal vertical and horizontal cable management panels.
    c. Cabinet installations shall have overhead cable tray installed.
    d. All cabinets shall have vented front and rear doors and side panels shall be solid for adequate airflow for proposed equipment to be installed.
    e. All cabinets shall have locking front and rear covers.
    f. Cabinets shall be provided with a full height ground bar. Refer to additional cabinet grounding requirements below.
3. Cabinets shall be full height.
4. All co-locating cabinets shall have same construction and keying characteristics of full height cabinets.
5. Cabinet Basis of Design: HP Pallet Intelligent Cabinet 842, 1075mm #BW917A.
6. Acceptable substitutions:
    a. Approved substitutions.

C. Rack and Cabinet Equipment

1. All rack equipment, wire managers, PDUs (power distribution units), etc. shall be black.
2. All racks/cabinets shall be provided with black equipment mounting screws.
3. Provide cable management devices (clamps, guides, supports, etc. as required to neatly dress/organize cables in and out of rack (or enclosure).
4. Provide horizontal and vertical (full rack height) cable management. Cable management fill rate shall not exceed 50% condition when all provided jacks are in use.

5. All Rack/Cabinet equipment shall be provided by the same manufacturer as the racks/cabinets with the following exceptions:
   a. Horizontal wire management.
   b. PDU.

D. Horizontal Cable Managers:

1. Horizontal wire managers shall have both front and rear channels with covers.
2. Horizontal wire manager Basis of Design: Panduit WMPH3, or approved substitution.

E. Vertical Cable Managers:

1. Racks:
   a. Each rack shall have one full-height double sided vertical cable manager on each side of each rack, 6" wide.
   b. Racks may share a vertical cable manager mounted between them when co-located.
   c. Basis of Design for rack vertical cable managers: Chatsworth 11729 series.
2. Cabinets:
   a. Each cabinet shall have one full-length vertical cable manager installed internally on each side.
   b. Vertical cable management shall be installed in rear of cabinet and provided by same manufacturer as the cabinet.

F. Jumper Tray:

1. Each rack shall have a jumper tray installed in the uppermost position.
2. Each cabinet shall have a jumper tray installed in the uppermost position.
3. Basis of Design for Jumper Tray: Chatsworth 12183 series.

G. Power Distribution Unit (PDU):

1. Refer to cabinet elevation drawings for PDU requirements at each equipment cabinet.
2. Surge protection to comply with UL 1449. For 330/400vac clamping voltage.
3. Basis of Design for PDU: APC.

H. Ground Bar:

1. Racks:
   a. Provide full height grounding strip for all rack mounted equipment.
   b. Racks shall have factory installed studs for crimp on ground lug at top and bottom of vertical rails.
   c. Connect to communication room TGB with minimum #6 THHN stranded wire; increase size of bonding cable to accommodate cable installations of excessive lengths per ANSI/TIA 607.
   d. All grounding connections shall utilize non reversible connectors and lugs.
2. Cabinets:
   a. Provide full height minus 6" ground bar.
   b. Mount in rear of cabinet and provide compression lug on top for connection to grounding system.
   c. Connect to communication room TGB with minimum #6 THHN stranded wire; increase size of grounding cable to accommodate any ground cable

installations of excessive lengths.

d. All grounding connections shall utilize non reversible connectors and lugs.

I. Miscellaneous: Provide all necessary accessories as required to support the placement of non-rack mountable equipment (e.g. termination blocks, fiber optic extenders, audio codecs, etc.) into cabinets.

2.7 LABELS

A. All Fiber Optic, metallic cable, TTBs (Telecom Spaces), Ground points, racks, cabinets, rack/cabinet-mounted equipment and cross-connects shall be identified and labeled according to ANSI/TIA 606 Administration Standards for Telecommunication Infrastructure of Commercial Buildings.

1. All label material shall be suitable for intended usage and environment, meeting the legibility, defacement and general exposure requirements listed in UL 969 for indoor and outdoor use. Where insert labels are used the insert label shall be covered with clear cover and shall be securely held in place under the normal operating conditions and usage to which the labeled infrastructure element is applied.
2. All items to be identified and labeled as listed above shall be labeled at the time they are installed.

B. Label printer shall be of the thermal transfer type capable of printing self-laminating labels of various size up to and including 1.5 inch by 1.5 inch printable area with a 4.5 inch self-laminating tail.

C. Label Printer Basis of Design: Brady BMP61 or approved equal.

D. In addition to color coding requirements specified in Division 26, Pathways, backbone fiber optic cables, and backbone metallic cable labels shall have a 1.5 inch by 1.5 inch printable area white in color with a 4.5 inch self-laminating clear tail.

1. Font shall be Arial Alt Mono 7 font size (11 point size).
2. Label shall have the ability to have 15 characters per line and 8 lines for a total of 120 characters.
3. Label Basis of Design: Brady P/N PTL-34-427 or approved equal, for inside use. For exterior use label shall follow the same character format, and meet the legibility, defacement, and general exposure requirements listed in UL 969.
4. The County reserves the right to modify the label characters and character layout providing label materials do not change, at no cost.
5. For all conduit or other pathways that have a diameter too large for the self-laminating label to over-wrap itself and fully laminate the printable area the label shall be changed to an insert type (tie-on is acceptable) and meet the exposure requirements in UL 969 for indoor and outdoor use. The insert label shall be covered with clear cover and shall be securely held in place under the normal operating conditions and usage to which the labeled infrastructure element is applied.

E. Cables which shall be labeled include, but are not limited to, backbone, horizontal, patch cords, line cords, and jumpers.

F. Contractor shall install all pathway and cable labels so they are visible and able to be read by a person standing on floor without moving cables, and if conduit/pathway, labels shall

not be obscured by other conduit, or components. Any additional types of labeling materials necessary to keep labels visible shall be provided by the Contractor and installed by the Contractor.

G. All metallic and fiber patch cords installed by Contractor or at direction of Contractor shall be labeled.

H. Pathways are defined but not limited to; any conduit, inner-duct, underground duct-bank, cabling troughs, pull boxes, and any materials or systems used to enclose cabling of any type.

I. All metallic/fiber horizontal cable and metallic/fiber patch cord labels shall have a 1 inch by 5 inch printable area white in color with a 1 inch self-laminating clear tail, labeled at each end.

1. Font shall be Arial Alt Mono, 7 font size (11 point size).
2. Label shall have the ability to have 15 characters per line and 2 lines for a total of 30 characters.
3. Label Basis of Design is Brady P/N PTL-31-427 or approved equal, for inside use. For exterior use label shall follow the same character format, and meet the legibility, defacement, and general exposure requirements listed in UL 969.

J. Equipment cabinet / Rack labeling

1. Provide phenolic nameplate fastened to top of racks and cabinets indicating rack / cabinet designation. Min 1" white text on black laminate.

2.8 CABLE TRAY/LADDER RACK

A. Ladder Rack (inside Communications Rooms):

1. Upper ladder rack shall be populated with horizontal and backbone copper and fiber cables and shall be mounted at 9' A.F.F., unless otherwise noted on communication room enlarged plans.
2. Lower ladder rack shall be populated with copper patch cables only and shall be mounted at 8' A.F.F., unless otherwise noted on communication room enlarged plans. No service loops are permitted inside ladder rack system.
3. Ladder rack shall be spaced off the wall 4" minimum to allow for cabling to pass vertically on wall.
4. Ladder rack width shall be 18" unless otherwise noted, refer to enlarged room plans.
5. 1-1/2" x 0.0625" wall rectangular tubing.
6. Cross members welded at maximum 12" intervals, ½" x 1".
7. Side mounted 6" cable guide/cable fence shall be mounted every other cross member, from same manufacturer as ladder rack.
8. Provide all accessories to support ladder rack from above and wall. Ladder rack shall not be supported from racks or cabinets. Supports shall be minimum 5/8" threaded rod.
9. Install ceiling supports as required, eliminating lateral movement.
10. All ladder rack mounted adjacent to walls shall be supported from the wall using brackets.
11. Supports shall be used as specified by the cable tray manufacturer for maximum loading characteristics of cable rack.

12. Provide supports as required by the manufacturer’s installation guidelines.
13. Edges, fittings and hardware shall be finished free from burrs and sharp edges. Ends shall have rubber boots.
14. Fittings shall have not less than the load-carrying ability of straight tray sections and shall have manufacturer's minimum standard radius unless otherwise indicated.
15. Furnish swept elbows for all direction changes.
16. Bond together to form an electrically continuous path.
17. Provide grounding kit to bond together sections of cable tray.
18. Provide transition pans to be installed where required on cable tray.
19. Transition pans with dividing fingers shall be installed on ladder rack above racks, cabinets and all locations required for routing copper patch cords. Transition pans shall match racking (black) in color and provided by the same manufacturer as the cable rack.
20. Provide all warning labels as required by UL, NEC and NEMA.
21. Finish: Black, including all accessories.
22. Basis of Design: Chatsworth.
23. Approved Substitutions:
    a. Legrand.
    b. B-Line.
    c. Homaco.

2.9 FIBER OPTIC OPEN TROUGH SYSTEM (FIBER GUIDE/FIBER TRAY)

A. All overhead ladder rack shall have installed an overhead fiber optic trough system with an open channel design to protect and route fiber optic patch cords. Troughs shall have removable top covers. All components shall be yellow in color.

B. Fiber trough shall be configured to provide a pathway between all 2-post racks, all cabinets, and wall mounted equipment in same communications room.

C. Trough shall have rounded flair downspouts and drop outs over each rack corner and vertical cable manager of sufficient length to enter top rung of vertical cable manager.

D. Fiber Trough width shall be 6 inch minimum.

E. Fiber Trough system shall be supported by manufacturer provided support kit of threaded rod/single support arm method, whether supported by ladder rack or unistrut.

F. Fiber Trough system shall have all end caps and protective bushings.

G. Fiber Trough systems shall be sized to not exceed manufacturer recommended patch cord fill rate based on area fiber ports.

H. Fiber Optic Open Trough Basis of Design: Panduit Fiber Runner series.

I. Acceptable substitutions: None.

2.10 CABLE TESTER

A. Copper cable tester technology required: basis of design: Fluke DSX-8000, or approved equivalent.

1. Copper cable tester shall be manufactured by a company engaged in the manufacturing of copper cable testing/certification equipment, and such equipment shall have been available for purchase from the chosen manufacturer for at least five consecutive years immediately preceding any test conducted to satisfy the requirements of this project.
2. Copper cable tester shall be a current model as manufactured by the chosen manufacturer and shall be currently in production, and fully supported by the manufacturer at the time any test is conducted to satisfy the requirements of this project.
3. Copper cable tester shall be calibrated by a factory authorized service provider within the 12 calendar months immediately preceding any test conducted to satisfy the requirements of this project. A Certificate of Calibration from the factory authorized service provider, identifying the specific unit calibrated, the date it was calibrated and that the specified unit is approved for service, shall be made immediately available to the County or field inspectors upon request. The last calibration date of the testing equipment/instrument used shall be documented in the test results provided to the Owner at any time such results are provided.
4. Any test results submitted to the County or inspectors that were conducted by a copper cable tester that does not meet the requirements specified herein will be rejected by the Owner. The Contractor will be required to repeat the necessary tests on the impacted cables with an approved tester at no additional cost to the owner and without impacting the project schedule or the Owner's operations.

B. Fiber cable tester technology required: basis of design: Fluke Versiv, or approved equivalent.

1. Fiber cable tester shall be manufactured by a company engaged in the manufacturing of fiber cable testing/certification equipment, and such equipment shall have been available for purchase from the chosen manufacturer for at least five consecutive years immediately preceding any test conducted to satisfy the requirements of this project.
2. Fiber cable tester shall be a current model as manufactured by the chosen manufacturer and shall be currently in production, and fully supported by the manufacturer at the time any test is conducted to satisfy the requirements of this project.
3. Fiber cable tester shall be calibrated by a factory authorized service provider within the 12 calendar months immediately preceding any test conducted to satisfy the requirements of this project. A Certificate of Calibration from the factory authorized service provider, identifying the specific unit calibrated, the date it was calibrated and that the specified unit is approved for service, shall be made immediately available to the County or field inspectors upon request. The last calibration date of the testing equipment/instrument used shall be documented in the test results provided to the Owner at any time such results are provided.
4. Any test results submitted to the County or inspectors that were conducted by a fiber cable tester that does not meet the requirements specified herein will be rejected. The Contractor will be required to repeat the necessary tests on the impacted cables with an approved tester at no additional cost to the owner and without impacting the project schedule or the Owner's operations.

2.11 HORIZONTAL CABLING AND TERMINATION

A. Patch Panels:

1. Category 6 UTP Patch Panel:
   a. Shall meet or exceed Category 6 rating for all components including but not limited to specifications within this document and as follows:
      1) IEEE 802.3AF (POE).
      2) IEEE 802.3AT (POE+).
      3) IEEE 802.3BT (POE++ 60W).
   b. Component certified to meet or exceed Category 6 standards.
   c. Configuration: Modular RJ-45 non-keyed 8-position jack port to 110 printed circuit board, factory pre-wired, Category 6.
   d. Wire Plan: EIA/TIA T568B.
   e. Active Pins: 1 through 8.
   f. Individual patch panel size not to exceed 48 ports.
      1) One horizontal wire manager shall be installed for every 24 ports in patch panel configuration, between each patch panel(s).
   g. Connection Hardware: IDC PCB (printed circuit board) mounted connector for 22-26 AWG.
   h. Include strain relief bar.
   i. UL listed and labeled.
   j. Finish: Black.
   k. Basis of Design: Optical Cable Corporation.
   l. Approved Substitution:
      1) None.
2. Category 6A STP Patch Panel:
   a. Shall meet or exceed Category 6A rating for all components including but not limited to specifications within this document and as follows:
      1) IEEE 802.3AF (POE).
      2) IEEE 802.3AT (POE+).
      3) IEEE 802.3BT (POE++ 60W).
   b. Component certified to meet or exceed Category 6A standards.
   c. Configuration: Modular Shielded RJ-45 non-keyed 8-position jack port to 110 printed circuit board, factory pre-wired, Category 6A.
   d. Wire Plan: ANSI/TIA T568B.
   e. Active Pins: 1 through 8.
   f. Must be backward compatible in all characteristics to Category 6 specifications.
   g. Individual patch panel size not to exceed 48 ports.
      1) One horizontal wire manager shall be installed for every 24 ports in patch panel configuration, between each patch panel(s).
   h. Connection Hardware: IDC PCB (printed circuit board) mounted connector for 22-26 AWG.
   i. Include strain relief bar.
   j. UL listed and labeled.
   k. Quick Grounding bar design.
   l. Provide strain relief on all cabling terminated in patch panel.
   m. Provide shielded panel kit including bonding jumper.

n. Finish: Black.
o. Basis of Design: Optical Cable Corporation.
p. Approved Substitution:
1) None.

3. Category 6A UTP Patch Panel:
a. Shall meet or exceed Category 6A rating for all components including but not limited to specifications within this document and as follows:
1) IEEE 802.3AF (POE).
2) IEEE 802.3AT (POE+).
3) IEEE 802.2BT (POE++ 60W).
b. Component certified to meet or exceed Category 6A standards.
c. Configuration: Modular RJ-45 non-keyed 8-position jack port to 110 printed circuit board, factory pre-wired, Category 6A.
d. Wire Plan: ANSI/TIA T568B.
e. Active Pins: 1 through 8.
f. Must be backward compatible in all characteristics to Category 6A specifications.
g. Individual patch panel size not to exceed 48 ports.
1) One horizontal wire manager shall be installed for every 24 ports in patch panel configuration, between each patch panel(s).
h. Connection Hardware: IDC PCB (printed circuit board) mounted connector for 22-26 AWG.
i. UL listed and labeled.
j. Quick Grounding bar design.
k. Provide strain relief on all cabling terminated in patch panel.
l. Provide shielded panel kit including bonding jumper.
m. Finish: Black.
n. Basis of Design: Optical Cable Corporation.
o. Approved Substitution:
1) None.

B. Telecommunications Outlets:

1. Telecommunication Outlet (TO):
a. Provide all copper, metallic, and fiber optic cable as designed for Telecommunication Outlets indicated on the drawings.
b. Provide Communication Outlet faceplates and jack modules for all type of cable media installed.
c. Jacks/ports/faceplates shall be provided from the same manufacturer.
d. All jacks installed in TO shall have colored bezel and dust shutter.
e. The TO faceplate shall have six port positions and be white or as specified by design to match surrounding area décor.
1) Faceplate shall have a recessed label area covered by a clear plastic lens, at top and bottom covering screws.
2) Exception: when face plate is stainless steel.
f. Manufacturers:
1) Hubbell.
2) Berk-Tek.

3) Or Approved equal.

2. Wall Phone Outlet:
   a. Single port wall plates with mounting studs for wall telephone installed as specified and served by one (1) Category 6 cable.
   b. Manufacturers
   c. Approved Substitution:
      1) Hubbell.
      2) Berk-Tek.
      3) Or approved equal.
3. Floor Outlets:
   a. Shall be designed with separate chambers for voice/data/electrical per NEC and ANSI/TIA specifications for dual service use.
   b. Voice and data jacks and mounting hardware shall meet ANSI/TIA Category 6 requirements for intended use.
   c. Voice and data jacks shall be recessed to protect cable ends when in use.
   d. Floor boxes shall have retractable covers to protect debris from entering voice and data jacks. Cover shall be capable of closing while jacks are in use.
   e. Manufacturers
      1) Legrand
      2) Hubbell.
      3) Or approved equal.

C. Telecommunications Modular Jacks:

1. Jacks and faceplates shall be by same manufacturer.
2. Jacks and modular patch panels shall be by same manufacturer.
3. Category 6 UTP Jacks:
   a. Meets ANSI/TIA-568-C.2 Category 6 specifications for all components including but not limited to specifications within this document and as follows:
      1) IEEE 802.3AF (POE).
      2) IEEE 802.3AT (POE+).
      3) IEEE 802.3BT (POE++ 60W).
   b. Supports IEEE 1000GBASE-T Ethernet.
   c. Tool-less design allows for simple, consistent, reliable terminations.
   d. Provide colored bezel for all jacks in accordance with Attachment 1 within this specification section.
   e. Accommodates 22-24 AWG conductors.
   f. Modular interface: 750 mating cycles.
   g. 50µ-inch gold-plated contacts.
   h. Zinc alloy housing.
   i. 1000 VDC Dielectric withstand.
   j. 500 MΩ insulation resistance.
   k. UL 1863 Listed.
   l. Manufacturers:
      1) Hubbell.
      2) Berk-Tek.
      3) Or approved equal.
4. Category 6A STP Jacks:

a. Shall meet or exceed Category 6A rating for all components including but not limited to specifications within this document and as follows:
   1) IEEE 802.3AF (POE).
   2) IEEE 802.3AT (POE+).
   3) IEEE 802.3BT (POE++ 60W).
b. Meets ANSI/TIA-568-C.2 Category 6A specifications.
c. Meets ISO/IEC 11801:2002 AMENDMENT 2 Class EA specifications.
d. Supports IEEE 802.3an 10GBASE-T Ethernet.
e. Tool-less design allows for simple, consistent, reliable terminations.
f. Provide colored bezel for all jacks as follows:
   1) Orange for standard Category 6A outlets.
g. Shielded housing to ensures superior ANEXT performance.
h. Accommodates 22-24 AWG conductors.
i. Modular interface: 750 mating cycles.
j. 50µ-inch gold-plated contacts.
k. Zinc alloy housing.
l. 1000 VDC Dielectric withstand.
m. 500 MΩ insulation resistance.
n. UL 1863 Listed.
o. Basis of Design: Optical Cable Corporation UMJ Series.
p. Acceptable substitution:
   1) Hubbell.
   2) Berk-Tek.

5. Fiber Optic Jacks:
   a. Shall be modular style.
   b. Shall be provided for MM or SM fiber cabling where required.
   c. Dual LC or SC connector, as required by application.
   d. Provide colored bezel for all jacks in accordance with Attachment 1 within this specification section.
   e. Basis of Design: Optical Cable Corporation UMJ Series.
   f. Acceptable substitution:
      1) Hubbell.
      2) Berk-Tek.
6. Category 6A UTP Jacks:
   a. Shall meet or exceed Category 6A rating for all components including but not limited to specifications within this document and as follows:
      1) IEEE 802.3AF (POE).
      2) IEEE 802.3AT (POE+).
      3) IEEE 802.3BT (POE++ 60W).
   b. Meets ANSI/TIA-568-C.2 Category 6A specifications.
   c. Meets ISO/IEC 11801:2002 AMENDMENT 2 Class EA specifications.
   d. Supports IEEE 802.3an 10GBASE-T Ethernet.
   e. Tool-less design allows for simple, consistent, reliable terminations.
   f. Provide colored bezel for all jacks as follows:
      1) Orange for standard outlets.
   g. Shielded housing to ensures superior ANEXT performance.
   h. Accommodates 22-24 AWG conductors.

i. Modular interface: 750 mating cycles.
j. 50µ-inch gold-plated contacts.
k. Zinc alloy housing.
l. 1000 VDC Dielectric withstand.
m. 500 MΩ insulation resistance.
n. UL 1863 Listed.
o. Basis of Design: Optical Cable Corporation UMJ Series.
p. Acceptable substitution:
   1) Hubbell.
   2) Berk-Tek.

D. Horizontal Cable:

1. All cable shall be installed, terminated, and tested by Contractor.
2. All cable jacket and construction shall be applicable for the intended installation environment to maintain full manufacturer's warranty and industry standard expected life cycle, including but not limited to specifications within this document section.
3. All cable shall include additional accessories such as clamps, supports, mounting hardware, straps, anchoring structures, termination hardware, etc. necessary to provide an industry standard installation in all environments. Accessories to include but are not limited to specifications within this document section.
4. Terminate all horizontal cabling on rack mounted patch panels.
5. Horizontal Copper CAT6 UTP Data Cable.
   a. Cable shall meet the following minimum requirements:
      1) Support for Power-over-ethernet including:
         a) IEEE 802.3AF (POE).
         b) IEEE 802.3AT (POE+).
         c) IEEE 802.3BT (POE++ 60W).

   b. Cable shall be four (4) pair copper unshielded twisted pair cable 23 gauge copper.
   c. Cable shall exceed Cat 6 performance requirements and have guaranteed performance to 400MHz.
   d. Certified to UL Category 6.
   e. Certified to ANSI/TIA Category 6 specifications.
   f. Shall meet ANSI/TIA-568-C.2–2009+A1:2010, Balanced Twisted-Pair Telecommunications Cabling and Components Standard, and current performance specifications for Category 6 rated cable.
   g. The cable shall have surface markings: Verified UL Category 6.
   h. Cable color: Continuous green jacket.
   i. Plenum rating: Where required cable shall be plenum rated and marked CMP or Plenum (UL) and meet UL-910 standards.
   j. Cable may be non-plenum rated where installed in non-plenum spaces/areas.
   k. Basis of Design: Superior Essex DataGain, Category 6 4 pair UTP cable.
   l. Approved Substitution:
      1) Mohawk - 6 LAN Plus.
      2) Berk-Tek – Lanmark 1000.
6. Horizontal Copper CAT6A STP Data Cable.

a. Cable shall meet the following minimum requirements:
   1) Shall meet or exceed Category 6A rating for all components including but not limited to specifications within this document and as follows:
      a) IEEE 802.3AF (POE).
      b) IEEE 802.3AT (POE+).
      c) IEEE 802.3BT (POE++ 60W).
   2) Cable shall be four (4) pair copper shielded twisted pair cable 23 gauge copper.
   3) Certified to UL Category 6A.
   4) Certified to ANSI/TIA Category 6A specifications.
   5) Shall meet ANSI/TIA-568-C.2–2009+A1:2010, Balanced Twisted-Pair Telecommunications Cabling and Components Standard, and current performance specifications for Category 6A rated cable.
   6) The cable shall have surface markings: Verified UL Category 6A.
   7) Cable color: Continuous orange jacket.
   8) Plenum rating: Where required cable shall be plenum rated and marked CMP or Plenum (UL) and meet UL-910 standards.
   9) Cable may be non-plenum rated where installed in non-plenum spaces/areas.
   10) Basis of Design: Superior Essex 10Gain, Category 6A 4 pair STP cable.
   11) Approved Substitution:
      a) Mohawk – GigaLAN 10.
      b) Berk-Tek -- LANmark-10G2.

7. Horizontal Fiber Optic Cabling:
   a. Horizontal Fiber Optic Cable shall be Single Mode.
   b. Refer to drawings for fiber strand count as specified.
   c. Cables that provide additional fibers to replace defective fibers in the cable shall not be permitted.
   d. Single-Mode Fiber Optic cable shall:
      1) Be single mode 9 micron core diameter/125 micron cladding diameter.
      2) Meet all applicable specifications for FDDI physical media.
      3) Fiber used in cable shall:
         a) Support applications using a bandwidth in excess of 1 GHz.
         b) Meet ANSI/TIA 492 AAAA standard.
      4) Interior building cables shall be tight buffered, non-gel-filled design.
      5) Cable shall be plenum rated and marked OFNP (UL) and meet UL-910 standards.
      6) Cable may be non-plenum rated where installed in non-plenum spaces/areas.
      7) Cable used for multi-story building risers must be marked OFNR (UL) and meet UL 1666 flame test or be plenum cable as specified above.
      8) Underground and exterior cables shall be loose tube, gel-filled design.
      9) Loose Tube, gel-filled cables shall be cleaned and terminated according to Cable Manufacturer and specifications within this document.
      10) The use of fan-out kits shall be required. The use of splice cases shall include splice trays.
      11) Horizontal single-mode cable basis of design: Corning.

12) Acceptable substitution:
    a) AFL.
    b) Prysmian.

8. Horizontal Fiber Optic Cabling:
    e. Horizontal Fiber Optic Cable shall be Multimode.
    f. Refer to drawings for fiber strand count as specified.
    g. Cables that provide additional fibers to replace defective fibers in the cable shall not be permitted.
    h. Single-Mode Fiber Optic cable shall:
        1) Be single mode 62.5 micron core diameter/125 micron cladding diameter.
        2) Meet all applicable specifications for FDDI physical media.
        3) Fiber used in cable shall:
            a) Support applications using a bandwidth in excess of 1 GHz.
            b) Meet ANSI/TIA 492 AAAA standard.
        4) Interior building cables shall be tight buffered, non-gel-filled design.
        5) Cable shall be plenum rated and marked OFNP (UL) and meet UL-910 standards.
        6) Cable may be non-plenum rated where installed in non-plenum spaces/areas.
        7) Cable used for multi-story building risers must be marked OFNR (UL) and meet UL 1666 flame test or be plenum cable as specified above.
        8) Underground and exterior cables shall be loose tube, gel-filled design.
        9) Loose Tube, gel-filled cables shall be cleaned and terminated according to Cable Manufacturer and specifications within this document.
        10) The use of fan-out kits shall be required. The use of splice cases shall include splice trays.
        11) Horizontal single-mode cable basis of design: Corning.
        12) Acceptable substitution:
            a) AFL.
            b) Prysmian

9. Horizontal Copper CAT6A UTP Data Cable.
    i. Cable shall meet the following minimum requirements:
        1) Shall meet or exceed Category 6A rating for all components including but not limited to specifications within this document and as follows:
            a) IEEE 802.3AF (POE).
            b) IEEE 802.3AT (POE+).
            c) IEEE 802.3BT (POE++ 60W).
        2) Cable shall be four (4) pair copper unshielded twisted pair cable 23 gauge copper.
        3) Certified to UL Category 6A.
        4) Certified to ANSI/TIA Category 6A specifications.
        5) Shall meet ANSI/TIA-568-C.2–2009+A1:2010, Balanced Twisted-Pair Telecommunications Cabling and Components Standard, and current performance specifications for Category 6A rated cable.
        6) The cable shall have surface markings: Verified UL Category 6A.
        7) Cable color: Continuous orange jacket.

8) Plenum rating: Where required cable shall be plenum rated and marked CMP or Plenum (UL) and meet UL-910 standards.
9) Cable may be non-plenum rated where installed in non-plenum spaces/areas.
10) Basis of Design: Superior Essex 10Gain, Category 6A 4 pair UTP cable.
11) Approved Substitution:
    a) Mohawk – GigaLAN 10.
    b) Berk-Tek.

E. Lightning / Surge Suppression for Horizontal Copper Cables:

1. Lightning protection assembly shall be comprised of Chassis and Modules and shall be provided for all cabling terminating outside the building envelope or otherwise susceptible to surge.
2. Chassis shall be installed directly above or below the patch panel being protected.
3. Surge Protection Chassis:
    a. Shall be high density, min ports per RU shall be 24.
    b. All modules shall be serviceable from the front.
    c. Modules shall be individual and field replaceable.
    d. Chassis Basis of Design: APC #PRM24.
4. Surge Protection Modules:
    a. Modules shall be selected based on CATx cable being protected and/or signal type.
    b. Modules shall be POE compliant and shall match required POE power requirement of cable being protected (30W, 60W or 100W).
    c. Model Basis of Design: APC #PNETR6.

F. Patch Cables:

1. Provide factory assembled patch cords sized to routing requirements.
2. Additional patch cable for specialty systems and equipment shall be provided as required to facilitate a complete and operational system.
3. Patch cords shall be constructed and provided by the same manufacturer that provided the data patch panels/termination hardware.
4. Patch cable shall match color and performance specifications of corresponding horizontal cable.

2.12 BACKBONE CABLING AND TERMINATION – FIBER OPTIC CABLE

A. Termination:

1. No service loops shall be permitted in overhead ladder rack for backbone cable.
2. Rack Mounted Modular Fiber Optic Patch Panels (FOPP)
    a. FOPPs shall be stackable, with modular connector bulkhead panels.
    b. Single Mode bulkhead connectors shall be designed strictly for single mode fiber.
    c. Other sizes' fiber connector bulkheads shall be designed for specified fiber size and type only.
    d. Side or rear cable entry.
    e. Storage area designed internally to neatly store slack cable.
    f. Hinge out patch/connector panels.

g. Each connector to have covers: single-mode shall be yellow, multi-mode shall be black.
h. Patch panel to consist of connectors as indicated on the project drawings:
   1) FOPP bulkhead connectors shall be SC-APC.
i. Provide a clear separation between horizontal and backbone fiber optic cables. Backbone fiber shall be in separate FOPPs than horizontal fiber.
j. When splice trays are required for termination of fiber they shall be of same manufacturer as FOPP and have brackets / provisions to securely and neatly stack inside the rear compartment of the FOPP. Trays shall be installed to allow future work in FOPP and serviceability of fiber cable.
k. Provide with all required cable management and accessories for a complete installation.
l. Terminate all fiber cable with factory terminated pigtail assembly; splices shall be made in splice tray. Refer to additional Splice trays requirements below.

3. Fiber Splice Trays:
   m. Fiber cable splice trays shall be used for all fiber cable terminations requiring spliced pigtails.
   n. Splice cases installed without splice trays designed are prohibited.
   o. Splice trays shall be tray type.
   p. Splice trays shall be provided by same manufacturer as FOPP(s) installed.
   q. All splices in tray shall be fusion type.

B. Intra-Building Backbone/Riser Fiber Optic Cable:

1. Intra Building cable shall be used where cable is not required to leave the building or be installed below grade.
2. Intra-Building backbone/riser fiber optic cable shall be Single Mode.
3. Refer to drawings for fiber strand count as specified.
4. Cables that provide additional fibers to replace defective fibers in the cable shall not be permitted.
5. Single Mode Fiber Optic Cable Requirements:
   a. Single mode 9 micron core diameter/125 micron cladding diameter.
   b. Meet all applicable specifications for FDDI physical media.
   c. Fiber used in cable shall:
      1) Support applications using a bandwidth in excess of 10 Gbps.
      2) Meet EIA/TIA 492 AAAA standard.
   d. Interior building cables shall be tight buffered, non-gel-filled design.
   e. Cable shall be plenum rated and marked OFNP (UL) and meet UL-910 standards.
   f. Cable may be non-plenum rated where installed in non-plenum spaces/areas.
   g. Cable used for multi-story building risers must be marked OFNR (UL) and meet UL 1666 flame test or be plenum cable as specified above.
   h. Terminate tight buffer cables at connector panels with pre-terminated factory pig tail assemblies. Provide splice tray inside FOPP for splice between building cable and pigtail assembly provide service loop in splice tray cable management area for maintenance and service.

C. Inter-Building Backbone/Riser Fiber Optic Cable (OSP):

1. Inter Building cable shall be used where cable is required to leave the building or be installed below grade or in wet location.
2. Backbone/Riser Inter-Building Fiber Optic Cable shall be Single-mode.
3. Refer to drawings for fiber strand count as specified.
4. Cables that provide additional fibers to replace defective fibers in the cable shall not be permitted.
5. Single-Mode Fiber Optic Cable Requirements:
   a. Single mode 9 micron core diameter/125 micron cladding diameter.
   b. Meet all applicable specifications for FDDI physical media.
   c. Fiber used in cable shall:
      1) Support applications using a bandwidth in excess of 10 Gbps.
      2) Meet EIA/TIA 492 AAAA standard.
   d. Underground and exterior cables shall be loose tube, gel-filled design.
   e. Loose Tube, gel-filled cables shall be Loose Tube, gel-filled cables shall be cleaned and terminated according to Cable Manufacturer and specifications within this document. The use of fan-out kits are required. The use of splice cases shall include splice trays.
   f. Backbone single mode OSP cable basis of design: Corning.
   g. Acceptable substitution:
      1) AFL.
      2) Prysmian.

D. Patch Cables:

1. Patch cables shall be provided in communications rooms for each FOPP termination, length shall be as required to reach any LAN switch, Passive Optical Network (PON) devices, active electronic device, and/or cabinet in same communications room.
2. The fiber optic cladding shall be covered by aramid yarn and an OFNR jacket. Specialty use patch cords shall have a jacket suitable for intended use.
3. Provided factory assembled patch cords with SC or LCAPC style connectors, coordinated with FOPP connector types, with ceramic ferrules length as required for routing.
4. Provide one (1) duplex patch cord for each Fiber Optic Patch Panel termination pair. Refer to Spare Material for additional information.
5. Patch cords shall be constructed and provided by the same manufacturer that provided the fiber patch panels/termination hardware.
6. Patch cable shall match color and performance specifications of corresponding backbone cable.
7. Patch cables shall be provided by the contractor.

2.13 ZONE ENCLOSURE

A. Description: Wall-mounted cabinets manufactured from steel sheet. Maximum equipment weight of 100 lb (45.4 kg) when secured to the structural wall with standard anchors.

B. Equipment Mounting Rails: Two pairs of equipment mounting rails shall provide 6U of rack-mount space.

C. Front Door: Solid and keyed.

D. Sides: Louvered near the top for inlet airflow with four 3/4 inch and 1-1/2 inch conduit knockouts for network cable access.

E. Bottom Panel: Vented for an exhaust fan with two 3/4 inch and 1-1/2 inch conduit knockouts for network cable access.

F. Top Panel: Solid removable top panel to provide access to internal equipment.

G. Rear Panel: 4 inches by 6 inches opening located near the bottom center of the cabinet for through-the-wall network cable access.

H. Electrical Connection: Single-gang 2 inch by 4-inch duplex electrical junction box for a single duplex electrical outlet

I. Color: Powder coat Black.

J. Accessories:

1. Fan Kit: Solid state temperature control variable fan speed with a 115 VAC, 60 Hz to 12 VDC power supply.
   a. Size: 4U, 65 CFM – 120 CFM (110 CMH – 204 CMH).
2. Power Outlet: Surge-suppressed duplex receptacle rated for 125 Volt, 15 Amps with two NEMA 5-15R outlets.
3. Fiber Slack Manager Panel: 19 inches wide rack-mount, 4U high and 2 inches deep in black.

K. Accessibility: Zone enclosures shall be mounted so as to be accessible for maintenance without requiring the use of a step ladder or lift. Ceiling-mounted zone enclosures shall be unacceptable. Refer to specification section 27 05 00 for additional information regarding accessibility of equipment.

1. Acceptable Manufacturers: Chatsworth (CPI) – Thinline II
2. Middle Atlantic – HDR
3. Hubbell – ReBox
4. Or approved equal.

PART 3– EXECUTION

3.1 COORDINATION

A. Refer to Specification Section 27 05 00 for requirements.

3.2 EQUIPMENT PROTECTION

A. Refer to Specification Section 27 05 00 for requirements.

3.3 WORK PERFORMANCE

A. Refer to Specification Section 27 05 00 for requirements.

3.4 EQUIPMENT INSTALLATION

A. Refer to Specification Section 27 05 00 in addition to the following.

B. General Installation Requirements:

1. Provide any necessary screws, anchors, clamps, Velcro ties, raceway, grounding or other support hardware required to facilitate the proper installation of the Structured

Cabling System.

2. All cable, terminating hardware, cabinets, racks, and all PDS components shall include additional accessories such as clamps, supports, mounting hardware, straps, anchoring structures, termination hardware, etc. necessary to provide an industry standard installation in intended environments. Accessories include but are not limited to specifications within this document section.
3. Locate, install, and test the Structured Cabling System in accordance with the equipment manufacturer's written instructions; the latest editions of the National Electrical Code; the National Electrical Contractors’ Association publication "Standard of Installation," according to Regulatory and Reference Documents section of this document, and all applicable codes and standards referenced in this specification.
4. Furnish any special installation equipment or tools necessary to properly complete the Work. This may include, but not be limited to, testing equipment, communication devices, jack stands, cable winches, etc.
   a. Furnish to the Owner any specialty hand tools needed to access any covers, access hatches, or other Contractor installed enclosures.
   b. Provide above hand tools by Substantial Completion Inspection or earlier if deemed necessary by Owner or Project Manager.
   c. Label all Comm Room outer doors “Communication Room ###”.
5. Install equipment, cables, raceways and outlets as required to comply with all applicable requirements within this specification document as minimum installation requirements. Exceed this minimum requirement when called for herein or as required to ensure a fully operational PDS.
6. Install all electrical basic materials per applicable sections of these specifications.
7. Install all rack mountable equipment in equipment rack, except that furnished and installed by the County.
8. Install system cabinets/racks in locations shown; arrange to provide adequate cooling, ventilation and access.
9. Properly bond system per applicable sections of these specifications.
10. Support raceways, backboards, and cabinets under the provisions of these specifications and as required by manufacturer's instructions.
11. Install raceways and pathways to conform to applicable sections of these specifications.
12. Install PDS system wiring and raceways away from any surface that may become hot, including and not limited to, hot water piping and heating ducts.
13. Install PDS system wiring with at least 12 inches of separation from line voltage power wiring on parallel runs. Wiring crossing power circuits shall be at right angles. For metal enclosed electric light or power or Class 1 circuits, separation may be reduced as described in NEC 800-52 (a) (1). Increase separation if so required to comply with ANSI/TIA referenced standards.
14. Maintain proper separation between PDS system cables and all power and unshielded cables, as required to prevent noise, crosstalk, etc.
15. All horizontal voice and data cables shall be splice-free and homerun to the patch panel in the associated Telecommunications Room or zone enclosure as shown on the drawings.

3.5 EQUIPMENT RACKS/CABINETS:

A. Equipment Racks/Cabinets shall be installed where shown on the drawings and in accordance with the manufacturer's instructions.

B. Whether or not specifically shown on the drawings, all racks and cabinets shall be installed as specified within this document.

1. Each equipment rack shall have one full-length vertical wire manager installed on each side of the equipment rack.
2. Each row of terminating frames and cable racks shall be bonded to ground with a minimum #6 stranded THHN copper cable with a continuous green jacket.
3. Remove paint from grounding lug attachment points on each rack. Each grounding lug to be attached to rack via nut and bolt method.
   a. Bonding cables within Communications Room to be installed separate route from all horizontal and backbone cabling, back to Telecommunications Grounding Busbar.
   b. This separate pathway shall hang from ladder rack.
4. When mounting any equipment in enclosure, provide width, height, hardware, etc. as required for complete and coordinated installation.
5. Horizontal wire managers are to be installed qty (1) for each 24 ports of modular copper cable patch panels.
6. For the maximum size allowed patch panel (48 ports) one horizontal wire manager to be installed above and one horizontal wire manager to be installed below.
7. Furnish and install blank plate covers in all empty equipment cabinet spaces.

3.6 TELECOMMUNICATION OUTLETS (TO)

A. Refer to Specification Section 27 05 00 in addition to the following.

B. Install cable to outlets for PDS where indicated on the drawings.

C. Install per applicable section of these specifications (i.e., outlet boxes, indoor service poles, floor boxes, wall phones, etc.).

D. Terminate all voice, data, and fiber optic cable on jacks wired per jack wiring details in Attachment One.

E. Install face plate on single-gang sheet rock ring. Label face plate per Attachment One.

F. All required cabling, outlet and faceplate labeling shall be completed at the time of installation.

G. All cable testing shall be complete before any cabling is put into use.

3.7 PATHWAYS

A. Refer to Specification Section 27 05 00 in addition to the following.

B. General:

1. All raceways shall meet the applicable requirements of all of Divisions 26, 27, 28 Specifications, and all requirements within this specification document.
2. All raceways at terminal boards shall turn 90 degrees down and terminate at a point within 6 inches of termination board with appropriate plastic bushing, and grounding

hardware.

3. Raceway shall not be shared by power or any other electrical wiring that is not part of the low voltage PDS systems. PDS system cabling may be installed in underground pull boxes with other low-voltage systems provided:
   a. Installation meets/complies with all applicable codes and standards.
   b. PDS system cables shall be separated by at least 12 inches from any non-shielded wire/cable.
4. Raceway Bends:
   a. Bend raceway with minimum inside radius of 6 times the internal diameter.
   b. Increase bend radius to 10 times for raceway larger than 2 inch size. Provide proper bend for all changes of direction.
   c. Pull and splice boxes shall not be used in lieu of a direction change in raceway.
   d. Install raceways so no more than 180-degrees of total bend are present between any two pull points in any raceway section without pull box.
      1) Install additional pull boxes as required to maintain maximum of 180-degrees in total bend between pull boxes and/or termination points.
      2) Label all raceway at both ends to indicate destination and PDS source room.
         a) Length of raceway and labeling/identification shall be fully documented in as-built drawings.
         b) As-built conduit/raceway marking nomenclature shall match exactly Identification Label format .
      3) Install polyester pull cord/pull tape in each conduit whether used or empty.
5. Pathways/raceways at terminal board locations shall be racked on a c-channel / strut channel (e.g. Unistrut / Kindorf) type rack secured to wall above and below terminal boards.

C. Penetrations/Fire Stop:

1. Make no penetration in floors, walls or ceilings without the prior consent of the County. It is the responsibility of the Contractor to firestop all rated walls, penetrations, and conduits affected to code compliant condition.
2. Where penetrations through acoustical walls or other walls for cable-ways have been provided, such penetrations shall be sealed in compliance with applicable code requirements and the Contract Documents.
3. Where penetrations through fire-rated walls for cableways have been provided, such penetrations shall be as required by code and the Contract Documents. Submit details of any special systems to be used.
4. Where conduit penetrates a fire rated wall, floor, etc., firestopping shall be provided and installed.
5. Provide permanent firestopping seals after cable installers have pulled risers and distribution cables.
6. Meet all requirements for UL assembly involved. Provide firestopping UL listed for assembly, conduit, and/or cable involved.

D. Sleeves:

1. Install rigid steel conduit sleeves with bushings on both ends at penetration of all

walls above ceilings. Stub-out each side of wall a minimum of 8 inches or as per design.

2. Install firestopping at sleeves and all rated firewall/smoke wall penetrations. Stub-out wall as required for routing. Firestopping assembly must comply with UL for wall routing, material and cable used.
3. Size sleeves as required by the NEC for cable installed, but in no case shall sleeve be less than 2 inch diameter, nor smaller than that required by "4)" below.
4. Sleeve size shall not be smaller than that required by ANSI/TIA-569, Table 4.1-1, "Conduit Sizing."

E. Cable Support:

1. Cable shall be supported in raceways according to this specification document.

F. Termination Locations:

1. Install vertical wireway to point within six (6) inches of each side of ceiling to facilitate ceiling penetrations.
2. Size wireway as required for cables and meet percent fill requirements of applicable codes/standards.
3. Provide bushings on each end of wireway, including grounding hardware, ground.

G. Telecommunication Outlet (TO) Horizontal Pathway:

1. Minimum size to be 1” C. Increase size of raceway to properly accommodate number of cables.

H. Backbone Conduit and Pathways (Intra-building or Inter-building):

1. Install raceways as required above under "General."
2. Minimum size: 2" C.
3. Increase size of conduit/raceway/pathway called for above if larger size is called for on drawings or larger size is required.
4. Conduit/raceway/pathway size shall not be smaller than that required by ANSI/TIA-569, Table 5.2-1, "Conduit Fill for Backbone Cable." Conduit size shall be based on type of cable and quantity of cables.
5. Install per applicable sections of these specifications and all applicable codes/standards.

I. Pull-boxes, Splice (Junction) Boxes, Outlet Boxes, Termination Enclosures:

1. Boxes shall be placed above accessible ceilings and in an exposed manner and location, and readily accessible. Boxes shall not be placed in a fixed false ceiling space unless immediately above a suitably marked and rated hinged access panel.
2. Where cables can be exposed in pull boxes.
3. All pull boxes installed to serve more than two 1” conduits shall be labeled and marked on as-built drawings.
4. All backbone and horizontal pathways (no exception unless in writing from Owner) pull boxes shall be placed in conduit run where:
   a. The length is over 100 feet.
   b. Total of all bends exceeds 180 degrees.

c. There is a reverse bend.
d. Boxes shall be placed in a straight section of conduit and not used in lieu of a bend.
   1) Every pull box shall have a hinged cover:
      a) Install appropriate access panel to allow cover to open.
      b) No backbone cabling shall rest on hinged cover when cover is closed. All cable shall have its own service loop coil support. No stick-on cable anchors are allowed.
   2) The corresponding conduit ends shall be aligned with each other.
   3) Conduit fittings shall not be used in place of pull boxes.
   4) Backbone cable pull-boxes shall have kind of strut or equivalent secured to inside top to support cables' service loops.
   5) No cable is to be supported by or strapped to another.

J. Horizontal Conduit and Pathways:

1. Size: Minimum pathway size to be 1" C.
2. Flexible conduit is not allowed.
3. Conduit type for location within Airport Property is per Division 27 specification requirements, Codes, and Regulatory and Reference documents specified within this document.
4. Outlet boxes shall be installed at locations shown on drawings per applicable codes/standards.
5. Where a pull box is required with raceway(s) smaller than 1-1/4 trade size, an outlet box may be used as a pull box.
6. Where a pull box is used with raceway(s) of 1-1/4 trade size or larger, the pull box shall:
   a. For straight pull through, have a length of at least 8 times the trade size diameter of the largest raceway.
   b. Have a distance between the nearest edges of each raceway entry enclosing the same conductor of at least: six times the trade size diameter of the raceway; or six times the trade size diameter of the larger raceway if they are of different sizes.
   c. For a raceway entering the wall of a pullbox opposite to a removable cover, have a distance from the wall to the cover of not less than the trade size diameter of the largest raceway plus 6 times the diameter of the largest conductor.
7. Where a splice box is used with raceway, it shall be sized per ANSI/TIA-569, Table 4.4-2, "Splice Box Sizing".
8. No box shall be smaller than that required by NEC 370-28 (a), (1) and (2).

3.8 TERMINATION BACKBOARDS

A. Terminal Boards:

1. Terminal boards shall be installed secure to wall with bottom of board at 6" above floor.
2. Install termination backboards plumb, and attach securely to building wall at each corner.
3. Finish paint termination backboards with durable gray paint having flame spread

rating of Class A prior to installation of any equipment on termination boards.

4. Mark all TTBs with TTB#.

3.9 COMMUNICATIONS CABLING REQUIREMENTS

A. Refer to Specification Section 27 05 00 in addition to the following.

B. All cable shall include additional accessories such as clamps, supports, mounting hardware, straps, anchoring structures, termination hardware, etc. necessary to provide an industry standard installation in intended environments. Accessories to include but are not limited to specifications within this document.

C. All cable shall be kept on reels until it is installed. Do not roll or store cable reels without an appropriate underlay and the prior approval of the OAR. Cable on reels shall be handled, loaded, unloaded and transported by approved machinery equipped specifically for these operations.

D. Replace any cable found to be defective.

E. Do not install any Structured Cabling System cabling alongside any power circuit or device. Structured Cabling System cabling shall not share the same raceway, channel or sleeve with electrical circuits or devices.

F. Ensure, during installation, that the maximum pulling tensions and bend radii of the Structured Cabling System cabling (both backbone and horizontal) are not exceeded.

G. Install cables in accordance with manufacturer's instructions and ANSI/TIA 568.

H. All cables shall be installed as illustrated on the drawings except where necessary to avoid EMI sources or other obstacles.

1. The County must approve major deviations from the illustrated path in advance.
2. No splices unless specifically noted otherwise.
3. Provide adequate cable size and length for each backbone/riser run.
4. All backbone cable shall be labeled at every location where the cable could be exposed.
   a. This includes all pull boxes and pull through locations.
5. Provide and install riser/backbone cable that meets performance requirements specified, and links all systems room locations indicated on Contract Documents.
6. Spare Cable (During Installation):
   a. The following spare cable lengths are to be left at termination ends of conduits after termination is completed:
      1) Main Distribution Frame (MDF) Rooms: Fiber and copper cables terminating MDF Rooms shall have enough spare cable length left to be routed to any point in the room from point of entrance to the room.
      2) Intermediate Distribution Frame (IDF) Rooms: Fiber and copper cables terminating in the IDF Rooms shall have enough spare cable length left to be routed in industry standard workman like manner, from the point of entry into the systems room, to the farthest equipment rack or backboard, then down to the floor plus three (3) feet.
7. Telecommunications Outlets: At the TO's, cables shall terminate with a minimum of twelve (12) inches of spare cable length for copper and twenty-four (24) inches of

spare cable length for fiber.

8. Install all cables no closer than 12" from any cable installed for Structured Cabling System, power system cable/raceway, or fluorescent/ballasted light fixtures.
9. All PDS cable shall be installed in the appropriate raceway.
10. Provide protection for exposed cables where subject to damage.
11. All cables in systems rooms shall be routed in overhead cable ladder racks and dropped into the appropriate racks utilizing transition pans. All cables shall be properly secured to the cable tray, racks, or cabinets.
    a. All fiber cable shall be routed in raceway specifically designed for fiber, and separate from copper cables.
12. Cables shall be terminated to preserve wiring order consistently across all termination (jacks, patch panels, connector blocks and patch cords).

I. Ensure consistency. Corrections shall be made at no additional cost to the Owner.

J. Install appropriate cable to match application, i.e., plenum, riser, etc. All cables shall bear CMP and/or appropriate marking for the application in which they are installed.

K. Cables/raceways routed through rated walls; floors and assemblies shall be routed via appropriate fireproofing system as approved by UL.

L. Horizontal Cables Copper and Fiber:

1. Provide and install adequate number of cables and cable lengths for each horizontal run.
2. Horizontal cables shall be terminated on patch panels in rack(s) or fiber FOPP.
    a. Install one horizontal wire manager directly above or below every 24 ports of patch panel(s).
    b. Terminate all cabling in designate system patch panel where applicable. (i.e. WiFi, CCTV, DS, VMS). Refer to specific labeling requirements for dedicated patch panels.
3. Shall be labeled per Division 27 Specifications.
4. Horizontal cables shall be installed in a neat and orderly manner.
5. Horizontal cables shall be dressed in MFD and IDFs without tangle or inter-wrapping.
6. Termination of all horizontal station copper cables shall be by PDS contractor and shall be according to ANSI/TIA 568B wiring configuration, all fiber cables by termination methods specified within this document.

M. Backbone Fiber Optic Cable:

1. Install fiber optic cable from each IDF to MDF in innerduct within conduit.
2. Termination in respective fiber optic patch panel shall be via connectors as described in Part 2.
3. Provide minimum 15FT feet of slack (service loop) on both ends of each fiber optic cable.
4. Observe all manufacturer's specifications relative to cable bend radius and pulling tension.
    a. All fiber cables to be installed without splices except at pigtails in FOPP or at outlets.

N. Provide adequate quantities and supporting hardware to terminate the quantity of cable pairs and fiber strands in the MDF and all IDF's as required to comply with these specifications.

3.10 ELECTRICAL POWER DISTRIBUTION

A. Refer to Division 26 and Specification Section 27 05 00 for requirements.

3.11 TRANSIENT VOLTAGE SURGE SUPRESSION

A. Refer to Specification Section 27 05 00 for requirements.

3.12 GROUNDING AND BONDING

A. Refer to Division 26 and Specification Section 27 05 00 in addition to the following.

B. Provide and install complete bonding system as required to comply with all sections of these specifications and applicable codes and referenced standards.

C. Connect all rows of racks and cabinets to Telecommunications Ground Bus (TGB) with AWG #6 THHN green jacket.

1. Each row shall have its own ground cable as described above.

D. Connect all horizontal and backbone metal conduit (via grounding bushing) to TGB.

E. Connect cable shields to Rack Grounding Busbar (RGB).

F. Connect surge suppression equipment to TGB.

3.13 EQUIPMENT IDENTIFICATION

A. Refer to Specification Section 27 05 00 and Attachments to this section in addition to the following.

B. Labeling – General:

2. Cables, pathways, significant Junction Boxes, structured cabling system components etc. shall be labeled at each exposed and termination point and as detailed below at the time of installation. All conduit, pathways, innerducts, enclosures, pull boxes and wireways shall be labeled.
3. Provide and install printed labels for all conduit, pathways, cables, patch cords, frames racks, enclosures, pull boxes etc.
4. All labeling shall be in accordance with ANSI/TIA-606. UL and NEMA requirements.
5. All structured cabling system components must be easily identifiable for any person that may need to locate telecommunications equipment, facilities, or circuit information.
6.
7. Cable and equipment management shall be performed using an Administration Database program that track all telecommunications circuit components. All copper and fiber test results must be exportable into format to allow importing into Telecommunications Administration Database.
8. Hand written labels shall not be acceptable.

C. Patch Panels:

1. Provide Permanente phenoloc label on each "dedicated patch panels" located in the

upper left hand side indicating patch panel designation, system designation, and warning; see below example:

a. PP-01 CCTV ONLY (PP-xx yyyy ONLY) x=patch panel number, y=System type.

D. Racks / Cabinets:

1. All Racks and cabinets shall have phenolic label mounted to the top of each rack or cabinet.
2. Labels shall be ¾" MIN letters and White lettering on black label.

E. Telecommunication Outlets (TOs):

1. All Telecommunication Outlets (TO) are to be labeled.

F. Cables and Pathways:

1. Cables that shall be labeled include but are not limited to backbone, horizontal, patch cords, line cords, and jumpers.
2. Labels shall be installed for all pathway and cable so they are visible and able to be read by a person standing on floor without moving cables, and if conduit/pathway, labels shall not be obscured by other conduit, or components. Any additional types of labeling materials necessary to keep labels visible shall be provided by the Contractor and installed by the Contractor.
3. All installed metallic and fiber patch cords shall be labeled.
4. Pathways are defined but not limited to; any conduit, inner-duct, underground duct-bank, wiring troughs, pull boxes, and any wiring systems used to enclose cabling of any type.
5. Any pathways or cables whose label format shall still be labeled in a similar format as directed by the County.
6. Cable and Pathway Labels shall be electronically generated by thermal transfer printer. All labels with all fields shall be delivered to the County electronically.
7. Cable and Pathway Labels shall be printed in ALL CAPITAL LETTERS. All components follow "End One" / "End Two" format and named for Inventory format following MCO standard GIS fields' structured labels. The County has the right to change field data and label structure without additional costs.
8. Cable and Pathway Labels shall be printed on adhesive tags no less than 2" in height and permanently placed, longitudinally or flagged. ALL LABELS MUST BE VISIBLE WHEN INSTALLED.
9. Cable and Pathway Labels shall be made of polyester or similar durable material with permanent adhesive characteristics typically found in telecommunication labels. Cable labels to be self-laminating. PER-PROJECT PRODUCTS USED ONLY AFTER SUBMITTALS ARE APPROVED BY the County.
10. Cable Labeling - Attached for easy access and visibility to the cable within 12" of entering the FOPP or terminating at Patch Panel.
11. Cable Labeling - Attached for easy access and visibility to the cable 12" – 16" before entering conduit or inner-duct pathway.
12. Cable Labeling - Attached for easy access and visibility to the cable on service loop on TTB for backbone cables.
13. When printing labels no line break shall fall in a data field. All line breaks to be after

nearest field separating character.

14. Pathway Labeling - Attached for easy access and visibility to conduit (occupied with cable or inner-duct). Shall be visible without movement.
15. Pathway Labeling - Attached for easy access and visibility to inner-duct (empty or occupied with cable) 12" – 16" before inner-duct enters conduit pathway.
16. Inner-duct and cables shall be labeled any time the inner-duct or cable is/can be exposed i.e. pull/junction boxes, manholes, and similar conditions.
17. Inner-ducts and cables shall be labeled in all pull-boxes, manholes, junction boxes. Labels to be minimum 4IN x 2IN, rated for outdoor use and permanently secured by one tie wrap at each end of label or as approved by the County.

G. The labeling scheme is to enable tracing data/circuit information flow between devices without physically tracing each cable, and will be used to identify the following communications infrastructure components and paths:

1. Where any active Electronic Systems are installed by any party requiring use of fiber or copper backbone or horizontal cables, the installation of fiber or copper patch cords shall be complete; all patch cords shall be permanently and properly routed in the pathway created for same, and the patch cords shall be labeled on each end with source/destination.
2. Each active device and its rack location.
3. Each patch panel, row and the associated active device.
4. Each active device cable and the device it is attached to at the other end.
5. Each dormant cable and its other end.
6. Each systems room cable and the systems room located at the other end.

H. All horizontal media (cable) shall be labeled at both ends indicating exact origination and destination information, using basis of design labeling method.

I. Any patch cords installed in MDFs, IDFs, or other rooms shall be labeled according to Division 27 specifications.

J. Passenger Boarding Bridge (PBB) Connectivity Infrastructure

1. The Technology Master Contractor shall label all cable provided by the PBB manufacturer as an extension of building premise distribution to technology and security devices located on the passenger boarding bridge in accordance with the Contract Documents. All points of PBB cabling transition and/or interface to building premise distribution shall be labeled per the PBB cable's identification.

K. Telecommunications Infrastructure Administration Records:

7. Submit to the County for review and approval a proposed telecommunications infrastructure administration record format.
   a. Upon approval and project completion, Tables shall be submitted in Hardcopy and electronic format.
      1) Hardcopy to be submitted in 3 ring binder at same time as cable test records.
      2) Electronic file to be submitted in Excel most current version..

3.14 MAINTENANCE AND SERVICE

A. Refer to Specification Section 27 05 00 for requirements.

3.15 WARRANTY

A. Refer to Specification Section 27 05 00 for requirements.

3.16 FIELD SERVICES

A. Refer to Specification Section 27 05 00 in addition to the following.

B. No fiber optic or copper cable shall be put into use without being successfully tested and the test results approved as submitted to the County.

1. All telecommunications cable provided by the passenger boarding bridge manufacturer as an extension of building premise distribution to technology and security devices located on the passenger boarding bridge shall be tested and submitted by the Division 27 Contractor.

C. Perform all testing where necessary or specified to assure a fully functional system. Repair or replace and retest components that fail performance standards.

D. Test all cables:

1. Provide all cable test results in both hardcopy and CD format.
2. The CD shall contain test results in tester native format and exported in comma delimited file.
3. All Test results shall be submitted in 3 ring binder with Project #, title, date, indicated on spine and front in no less than 24 font size Arial font.
4. All Binder labeling to be machine printed.
5. Multiple binders shall also be labeled as volume of total volume set, I.E. 1-3, 2-3, 3-3, etc.
6. Test instrument data fields shall exactly match component labeling, I.E. Telecommunication Outlets, FOPPs, etc., provide exact source/destination information for all media tested.
7. All copper backbone testing shall be in its own binder.
   a. A divider shall be placed between each cable's test results.
8. All backbone fiber test results shall be in its own binder.
   a. A divider shall be placed between each cable's test results.
9. All horizontal copper voice and data cable test results shall be together in a binder, with each Telecommunication Outlet's test results pages together and sequential.
10. Each volume/binder shall have Installing/Testing Contractors company information and warranty phone numbers to call for service.
11. Test results submittal shall include calibration certification, within twelve months of the test date, for the test equipment used by the Contractor.

E. Provide system verification and acceptance documentation signed and dated by the installer.

1. This documentation shall include test measurements and system calibrations performed for the entire system.
2. Sample system operations shall also be performed with actual hardware or using

Contractor provided test equipment and documented to verify that the system is operational and ready for acceptance.

3. This shall also establish the baseline performance of the system.

F. Fiber Optic Cable Testing:

1. Each fiber in every backbone inter-building and intra-building cable and every horizontal cable run shall undergo testing in accordance with Annex E of ANSI/TIA-568-C, including Tier 1 testing for length, polarity and Optical Return Loss (ORL), using an Optical Loss Test Set (OLTS), and the additional steps required for Tier 2 testing using an Optical Time Domain Reflectometer (OTDR). The test methods and configuration of equipment and test cords for both Tier 1 and Tier 2 tests shall be as detailed in ANSI/TIA-526-7-A.
2. Test results shall include a record of:
   a. Wavelength.
   b. Fiber type.
   c. Fiber and cable number.
   d. Measurement direction.
   e. Test equipment model and serial numbers
   f. Date.
   g. Reference setup.
   h. Operator (crew members).

G. Copper Category 6 or higher, UTP & STP Cable Testing:

1. Every cable and connector pin for each horizontal cable run from an MDF or IDF to a Telecommunication Outlet (TO) shall be tested up to 250 MHz for Category 6 rated operation:
   a. Continuity on each pin.
   b. Correct pin-pair orientation (wiremap).
   c. Propagation Delay (100 m).
   d. Skew (100 m).
   e. Near end crosstalk (NEXT value).
   f. Power Sum Near End Crosstalk (PSNEXT).
   g. dB loss (attenuation).
   h. Equal Level Far End Crosstalk (ELFEXT).
   i. Power Sum Equal Level Far End Crosstalk (PSELFEXT).
   j. Return loss.
   k. Cable length.
   l. Presence of AC voltage.
   m. The Category 6 cable shall be tested for the conformance to the specifications of ANSI/TIA 568-D Category 6.
   n. Should UTP cable type in project be changed to make use of updated cable technologies, testing of cable shall conform to latest industry standard and manufacturer's testing requirements to ensure cable has been correctly installed and is operating to specification.
   o. STP cabling shall include the following additional test requirements:
      1) Cable shield continuity
      2) Power Sum Alien Near-End Crosstalk (PSANEXT) test

3) Power Sum Attenuation-to-Alien-Crosstalk Ratio at the Far End (PSAACRF) test

p. Category 6A rated cable shall include the following additional requirements:

1) Perform all testing required for Category 6 rated cable up to a frequency of 500MHz for all Category 6A rated cable.

3.17 TRAINING

A. Refer to Specification Section 27 05 00 in addition to the following.

B. Training and orientation of installed structured cabling system and OSP components and active equipment shall be provided to the Owner.

1. Training instruction shall include any additional active Systems as required by Project.
2. Training shall cover all locations where structured cabling and/or Systems have been installed and or modified.

3.18 PROJECT CLOSEOUT REQUIREMENTS

A. Refer to Specification Section 27 05 00 in addition to the following.

B. Upon completion of the aforementioned tests and before system commissioning and final acceptance, actual voice and data testing shall be performed.

C. The tests may be performed with existing equipment, if in place, or using contractor provided equipment or test equipment.

D. The tests shall be performed at Owner's discretion and on a sample basis (10% of installed Telecommunication Outlets, copper pairs, and fiber strands) on various portions of the network as determined by the County.

1. The tests shall be witnessed by the Contractor, and the County.

E. Demonstrate system to designated Owner personnel as required by applicable sections of these specifications.

1. Conduct walking tour of project.
2. Briefly describe function, operation, and maintenance of each component.
3. All pull-box covers shall be removed so Owner can inspect for proper installation of cable and labels.
4. Provide detailed operation and maintenance instruction and training.
5. Use submitted operation and maintenance manual as reference during demonstration and training.

END OF SECTION 27 10 00

PART 1 - GENERAL

1.1 STIPULATIONS

A. Project drawings and general provisions of the Contract, including but not limited to all; General and Supplementary Conditions, Division 01 Specification Sections and stipulated Specification Sections shall apply to this and all related Division 27 Specification Sections.

B. Related Specification Sections:

1. Refer to Specification Section 27 05 00 for a complete list of related specification sections.

C. Reference Symbols:

2. All device symbols are defined by the appropriate symbol schedule on the symbols and abbreviations sheet in the systems drawing package. Not all device symbols indicated may be required for the project.
3. Due to the scale of the drawings, symbols are shown on the drawings close as possible to the intended mounting location. The Contractor shall coordinate exact locations with all drawings and affected trades prior to submittal of shop drawings.
   a. The installing Contractor shall coordinate exact locations with all security and telecommunications drawings, site plan drawings as well as related Specification Sections of affected trades and systems prior to the submittal of any shop drawings.

D. Abbreviations:

1. Refer to Specification Section 27 05 00 for requirements.

E. Definitions:

1. Refer to Specification Section 27 05 00 for requirements.

1.2 SUMMARY

A. Refer to Specification Section 27 05 00 in addition to the following.

B. The intent of this specification is to establish a standard of quality, functions, and features for implementation of a TCP/IP-based VoIP System into the new Trenton-Mercer Airport terminal and locations and as indicated on the contract drawings and/or herein specified.

C. Contractor shall include all work, materials, infrastructure, equipment, software, licensing, programming, coordination with the County as required to provide a fully integrated and operational system as herein specified.

1. The installation, performance, features, functions, software and programming modifications as specified herein as well as all related specification sections have been designed to offer the maximum system efficiency for ease of operation, occupant safety and the protection of equipment as recommended by the County.
2. Prior to the submission of the Bid, any discrepancies or inconsistencies noted within these specifications and/or project drawings shall be brought to the immediate attention of the County.
   a. Any deviations from the specified criteria shall be documented, reviewed and agreed to in writing by the County prior to submission of bids. Refer to Division

01, and 27 05 00 Specification Section and 27 10 00 Specification Section for product substitutions.

1) The required information shall include but not limited to: reason for deviation, all differences in performance, operation, and function from the herein specified requirements, all benefits, and added features to owner as a result of the deviations and any additional incurred costs to owner for maintenance and long term ownership. The information shall adhere to the requirements found in Div. 01 and 27 05 00 specifications sections.
2) Failure to provide the County with the required information shall result in all shop drawing submissions being returned for non-conformance with the contract requirements.

3. It shall be the responsibility of the contractor to coordinate active and passive network electronics, electrical power, UPS units, and ensure that 3rd party equipment installed meets or exceeds every standard set forth in these specifications. Contractor shall be responsible for providing a complete and functional VoIP enterprise-based system, including all necessary telephone instruments, components, devices, servers, active and passive network electronics, electrical power, UPS units, software, programming, commissioning, testing and all appurtenances as well as the integration to all ancillary systems as necessary to provide a complete and fully operational system whether specifically included in this section or not.
   a. The system shall consist of, but not be limited to, all equipment, devices, servers, administrative workstations, network servers, telephone instruments, network communications equipment, power supplies, conduits, cabling, software, programming and all appurtenances as well as the integration of the facility's Public Announcement System (PA), airport databases, and all related systems necessary to provide a complete operating TCP/IP based networked system in accordance with the contract documents.
      1) The Contractor shall have a registered RCDD professional review and seal all system shop drawings demonstrating industry standard design, installations and certifications of all structured cabling networks related to the installation and operation of the Voice over IP Telephone System and all related TCP/IP based electronic security systems.
      2) Refer to Specification Sections 27 05 00 and 27 10 00 for all TCP/IP based cabling requirements.

D. Contractor shall assume total system responsibility for providing all connections and cross-connections to:
   1. The Incumbent Local Exchange Carrier, Competitive Local Exchange Carrier, Session Initiation Protocol providers (SIP), Internet Service Providers (ISP), SIP trunks, PRI circuits, inter-office ring, Central Office Lines (CO), or remote off premises communications by the County.
   2. Contractor shall coordinate with the County for incoming services which may be implemented, added, or purchased prior to installation.

E. The Contract drawings and specifications may not deal individually with every part, control, device, software or programming, which may be required to produce the equipment and/or

system performance specified or as necessary for the installation and integration of all requirements of the Contract Documents.

1. The Contractor shall include all such items and components, as required, for the complete and operational installation of all system components as defined by the Contract Documents, whether or not specifically indicated and/or specified.
   a. Include such items, as required, for a complete operational system, whether or not specifically indicated.
   b. Coordinate with other applicable trades in submittal of shop drawings and the installation of all systems.
   c. Shop drawings shall detail space conditions to accommodate other concerned trades, subject to final review by the County.
   d. Provide all wiring, connections, patch cords at the telephony devices, within the closet, termination points to support all equipment, circuits and devices as well as all coordination and programming for the integration of all VoIP integration, and ancillary systems. Refer to the contract drawings and related Specification Sections for additional information.

F. All references to industry and trade association standards as well as all building codes are minimum installation requirements for this system. The codes, standards and agencies listed in Specification Section 27 05 00 shall form a part of this Specification Section and all work shall comply with the latest adopted standards.

1. The publications listed in Specification Section 27 05 00 (including all amendments, addenda, revisions, supplement, and errata) shall form a part of this Specification Section to the extent referenced. The publications are referenced in the aforementioned Specification Section by the basic designation only.

G. The Contractor shall coordinate with County for initial deployment of the VoIP components which shall consist of, but not be limited to, the following:

1. Installing all telephones accessory devices, and mountings throughout the facility.
   a. Installing telephones consist of distribution of desk phone, wall phones, installing mounts for each application, routing of patch-cord through telephone cable guides.
   b. Routing patch cable through furniture to reach voice and data outlet.
2. The Contractor shall furnish and install all phones and accessories.
3. Contractor shall coordinate with the County for computer generated labels that will be applied to the phone identifying its extension and computer generated labels on telephone soft key buttons. Furnish and install all telephone audible and visible enhancement equipment and connectivity that will reside with or on telephones. Refer to spec section Hardware Requirements for furnishing responsibility.
4. (1) TTY phone shall be mounted at every bank of courtesy phones. Refer to drawings for additional requirements.
5. Courtesy phone enclosure mounting. Contractor shall be responsible for mounting courtesy phone within ADA required enclosure.
6. The Division 27 contractor shall install telephones to ADA requirements.

H. Contractor shall be responsible for all integration with the LAN and necessary configuration to provide the functionality described within this document. Any configuration shall be performed in coordination with and approval by the County.

1. Contractor shall furnish and install the following systems as part of the VoIP solution:
   a. All software, licensing, latest firmware and hardware components necessary for VoIP to function as specified.
   b. All required active network switches dedicated for the telephone switch.
   c. Cross connections and intra-connections to service provider incoming telecommunication trunk lines.
   d. System training as specified.
   e. System warranty as specified.
   f. System testing and acceptance plans as specified.

I. The Division 27 integrator shall be responsible for providing all equipment, devices, system components, final cable terminations, programming, commissioning, and testing of all VoIP Telephone components in accordance with all related Division 27 Specification Sections.

1.3 REFERENCES

A. Publications and standards listed in Specification Section 27 05 00 shall form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. All references to industry and trade association standards as well as all building codes are minimum installation requirements for this system. The codes, standards and agencies listed in Specification Section 27 05 00 shall form a part of this Specification Section and all work shall comply with the latest adopted standards.

1. Where the Contract Documents mandate a greater requirement or performance than those specified by the aforementioned referenced codes and standards, the greater requirement shall be the governing design application for this project.

1.5 SYSTEMS DESCRIPTIONS

A. Refer to Specification Section 27 05 00 for requirements.

1.6 SUBMITTALS

A. In addition to all requirements as specified by Division 01 and Specification Section 27 05 00, the Telephone Equipment and components shall also be provided in accordance with the following requirements:

1. Shop drawings shall detail space conditions to accommodate other concerned trades.
2. Provide a complete signal flow diagram with connectivity component and connectivity identified.
3. Any new integration protocols, communications connectivity and interface components to the facility's VoIP PBX system.

1.7 QUALITY ASSURANCE

B. Refer to Specification Section 27 05 00 for requirements.

4. The contractor shall be a manufacturer-certified installer with a minimum of 5 years experienced installing and maintain the submitted manufacturer's equipment.

1.8 DELIVERY, STORAGE AND HANDLING

A. Refer to Specification Section 27 05 00 for requirements.

B. Contractor shall coordinate voicemail storage requirements with the County. Contractor shall furnish, install and configure a networked storage system for the voicemail system.

1.9 RECORD DOCUMENTS

A. Refer to Specification Section 27 05 00 for requirements.

1.10 OPERATIONS AND MAINTENANCE

A. Refer to Specification Section 27 05 00 for requirements.

1.11 SOFTWARE AGREEMENT

A. Refer to Specification Section 27 05 00 for requirements.

1.12 SPARE MATERIAL

A. All spare material shall be furnished by the Contractor. Refer to section 2.4.B for additional information.

PART 2 - PRODUCTS

2.1 MANUFACTURED PRODUCTS

A. Refer to Specification Section 27 05 00 for requirements:

2.2 SYSTEM CONFIGURATION REQUIREMENTS

A. Contractor shall coordinate with the County's VoIP System configuration which shall include, but not limited to, the following:

1. The VoIP system shall have priority within a converged network for life safety.
2. Shared Tenant Services shall be implemented, whereas Authority programs, manages, and maintains all voice services for airlines, vendors, agencies (e.g. TSA), and satellite buildings.
3. The PBX programming between County and tenant services shall not overlap or configured to allow bypass, or interact across operational platforms. Each tenant VoIP partition shall operate as virtual standalone VoIP PBX systems.
4. Administration controls will be managed through the County.
5. Voice Recording Services shall follow the County's current standards.
6. Courtesy phones shall only allow local call and shall block any calls to pay services numbers.
7. Code Blue phones located in the parking garage shall be configured to call as follows:
   a. Emergency Button shall call 911 direct.
   b. Assistance Button shall call Parking help desk with roll-over to the law enforcement officer (LEO) office if not answered by the Parking help desk
8. Coordinate programming of all telephone system auto attendant, call routing, extensions, grouping, hunt group, forwarding, ring forward, voicemail, DSS buttons, schedules (holiday, after hours, etc.) with the County..

2.3 SYSTEM AND SOFTWARE REQUIREMENTS

A. Provide all VoIP platform software and programming gas required for a fully-functional phone system.

B. All software licenses shall become property of the County at project completion.

2.4 HARDWARE REQUIREMENTS

A. Contractor shall install telephones system to meet or exceed the following requirements. The contractor coordinate and schedule deployment of hardware with the County.

1. Requirements TBD.

PART 3 – EXECUTION

3.1 COORDINATION

A. Refer to Specification Section 27 05 00 for requirements.

3.2 EQUIPMENT PROTECTION

A. The Contractor shall be responsible for protection of all materials, equipment, devices or components permanently installed and/or stored on the job site. Protect all materials, equipment, cabling, devices or components during construction and after installation. Provide appropriate protection of all materials, equipment, components and/or devices until time of substantial completion. All materials, equipment, components and/or devices shall be protected during shipment and storage against any physical damage, dirt, moisture, cold, snow or rain:

1. During installation, enclosures, racks\cabinets, equipment, controls, controllers, circuit protective devices, and other like items, shall be protected against entry of any foreign matter; and shall be vacuum cleaned both inside and outside before testing and operating and repainting if required.

2. Any materials, equipment, components and/or devices, stored on site which have been deemed by the County to exhibit or indicate damage, exposure to dust or moisture shall not be installed and shall be returned to the manufacturer for immediate replacement.
   a. The use of spare parts or the return of defective equipment after repair to mitigate the damage of defective materials, equipment, components and/or devices shall not be acceptable. All materials, equipment, components and/or devices shall be new and unused until final acceptance by the County.
3. The Contractor shall provide and apply protective material immediately upon receiving the products and maintain throughout the construction process.
   a. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
   b. Any damaged paint on equipment and materials shall be refinished with the same quality of paint and workmanship as used by the manufacturer so repaired areas is not obvious or detectable.
4. Failure to properly protect all materials, equipment, components and/or devices prior to final acceptance shall constitute sufficient cause for rejection of materials, equipment, components and/or devices should any defects, damage or degradation in performance is observed.

B. Immediately replace all malfunctioning materials, equipment, components and/or devices with new unused products up until the time the County issues final acceptance of the

system. The returning of any malfunctioning equipment, devices and/or components to the manufacturer for repair and then reinstallation at the project site shall not be acceptable.

1. All replacement materials, equipment, components and/or devices shall be factory new and not scavenged from the Project's spare parts inventory or factory recycled products.

3.3 WORK PERFORMANCE

A. Refer to Specification Section 27 05 00 in addition to the following:

1. Refer to related Specification Sections for additional project coordination requirements. In addition to the requirements defined in this Specification Section, the contractor shall coordinate and meet all requirements addressed in Division 26, Division 27 and Division 28 Specification Section.
2. Supply all software and hardware necessary for the systems(s) to function as specified.
3. System Cabling Refer to specifications section 27 10 00 and section 27 10 05.
4. The Contractor shall prepare the necessary documents required for installing, testing, and bringing the VoIP online. Such documents include but are not limited to:
   a. Project management and quality assurance plans
   b. Testing plans
   c. Component and system submittal documents
   d. Installation plans
   e. Component design plans
   f. System user documentation
   g. As-built drawings and documentation
5. The Contractor shall coordinate with the County to ensure the system meets the requirements. The Contractor shall meet all ADA requirements.
6. The Voice over IP Telephone System (VoIP) shall support the entire airport terminal.

3.4 EQUIPMENT INSTALLATION

A. All system equipment installations shall be in accordance with good engineering practices, NEC, local building codes, and all manufacturer's requirements. Cable terminations at all equipment locations shall comply with all state and local electrical codes. All wiring shall test free from all grounds, shorts, stray voltages and EMI.

B. Follow manufacturers' instructions for installing components and adjusting all equipment and cabling. Submit two (2) copies of such instructions to the County before installing any equipment. Provide an additional copy of such instructions at the equipment during any work on the equipment. Where no instructions are included with the equipment, follow accepted industry practices and workmanlike installation standards.

C. Equipment location shall be as close as practical to locations as indicated on the contract drawings.

1. Provide all equipment clearances in accordance with NEC requirements. Arrange equipment to facilitate unrestricted access for maintenance and service around all equipment, components and/or cable terminations.

D. Inaccessible Equipment:

1. Where the County determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, the equipment shall be

removed and reinstalled as directed at no additional cost to the project.

a. "Conveniently accessible" is defined as being capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as, but not limited to, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.

3.5 INSTALLATION REQUIREMENTS

A. In addition to all demonstration and training as specified by Division 01, Specification Section 27 05 00 and related Division 27 Specification Sections, system installation shall be provided in accordance with all requirements of this Section.

B. General

1. System/Hardware and mounting must comply with IBC Seismic Requirements.
2. Where undefined by codes and standards, Contractor shall apply a safety factor of at least 2 times the rated load to all fastenings and supports of system components.
3. The Contractor shall install all system components including furnished equipment in accordance with the manufacturer's instructions, NFPA 70, ANSI-C2 and shall furnish all cables, connectors, terminators, interconnections, services, and adjustments required for a complete and operable system.
4. Grounding shall be installed as necessary to prevent ground loops, noise, and surges from adversely affecting system operation.
5. For equipment mounted in drawers or on slides, provide the interconnecting cables with a service loop of not less than three feet and ensure that the cable is long enough to allow full extension of drawer or slide.
6. The Contractor's quality assurance Inspector shall conduct a visual inspection of all installations to verify that the installations are in accordance with the project’s and manufacturer's specifications. Records of the inspections signed and dated by the Quality Assurance Inspector shall be provided to the County. Prior to any scheduled inspections the County representative shall be notified by the Contractor of any inspection(s) so they may witness.
7. Phones:
   a. Phones shall be installed at desk and wall phone locations identified in the drawings.
   b. Desk phones shall have the patch cord routed through phone cable pathway allowing the desk phone to sit flush against the surface.
   c. Phones identified to be mounted on the wall brackets shall be installed and cable routed so that the phone bracket is securely attached to the wall plate studs.
   d. Courtesy phones shall be mounted per manufacturing installation requirements.
   e. Jet bridge phones shall be wall mounted at designated area. Contractor shall coordinate with jet bridge contractor for exact location.
8. Gateways:

   a. Gateways shall be mounted in the floor serving MDF and IDF’s unless otherwise noted.

   b. Gateways shall be mounted within a cabinet. Gateways shall be rack mounted where applicable. Gateways that cannot be mounted to cabinet rails shall reside on a cabinet mounted shelf. These gateways shall be consolidated and neatly place on the shelf.

C. Software Installation

1. The Contractor shall test all custom and packaged software in development and production environments, and have successfully passed factory acceptance testing, prior to installation on-site.

D. Hardware Installation

1. Final hardware selected and installation of hardware shall be coordinated with the Project Manager. Additionally, the Contractor shall ensure the ventilation requirements for the all hardware components are met.
2. The Contractor shall install and inspect all hardware required in this specification in accordance with the manufacturer's installation instructions. Final placement of hardware is subject to the County approval.
3. The Contractor shall be responsible for any and all loss or damage in the shipment and delivery of all material until transfer of title to the County.
4. The Contractor shall obtain written permission from the County before proceeding with any work which requires cutting into or through any part of the building structures such as, but not limited to, girders, beams, concrete, carpeted or tiled floors, partitions or ceilings. The Contractor shall obtain written permission from the County before cutting into or through any part of the building structures where fireproofing or moisture proofing could be impaired. In any such case the Contractor shall be responsible for restoring the affected area to "like-new" condition or to a condition to match the existing conditions.
5. The Contractor shall take all steps necessary to ensure that all public areas remain clear or are properly marked during installation or maintenance.
6. The Contractor shall place materials only in those locations that have been previously approved. Any other locations shall be approved, in writing, by the County.
7. The Contractor shall label all cabling and patch cords in accordance with the Division 27 specifications. Coordination with the County shall be performed, and all labeling shall be approved, prior to implementation.

E. System Startup

1. The Contractor shall not apply power to the system until after:
   a. System and components have been installed and inspected in accordance with the manufacturer's installation instructions.
   b. A visual inspection of the system components has been conducted to ensure that defective equipment items have not been installed and that there are no loose connections.
   c. System wiring has been tested and verified as correctly connected as indicated.
   d. All system grounding and transient protection systems have been verified as properly installed and connected, as indicated.
   e. Power supplies to be connected to the system and equipment have been verified as the correct voltage, phasing, and frequency as indicated.
   f. Satisfaction of the above requirements shall not relieve the Contractor of responsibility for incorrect installations, defective equipment items, or collateral damage as a result of Contractor work/equipment.

3.6 COMMUNICATIONS CABLING REQUIREMENTS

A. Refer to Specification Section 27 05 00 for requirements.

3.7 ELECTRICAL POWER DISTRIBUTION

A. Coordinate with the Division 26 contractor, the County prior to connections and/or modifications to the electrical distribution panels. Additional locations requiring electrical power by the specific products and/or integrator selected equipment shall be the responsibility of this Electrical Contractor to include as part of this project.

1. Primary power for all system controls, sub-control panels, processors, and power supplies shall be configured to switch to emergency backup power sources automatically when primary power is interrupted without degradation of any critical system functions.
2. All electrical power shall be hardwired to the panel. System components or panels employing the use of plug-in transformers, extension cords or cheater cords for the connection to electrical power shall not be acceptable.

3.8 TRANSIENT VOLTAGE SUPPRESSION

A. Refer to Specification Section 27 05 00 for requirements.

3.9 GROUNDING AND BONDING

A. Refer to Specification Section 27 05 00 for requirements.

3.10 EQUIPMENT IDENTIFICATION

A. Refer to Specification Section 27 05 00 for requirements.

3.11 MAINTENANCE & SERVICE

A. Refer to Specification Section 27 05 00 for requirements.

3.12 WARRANTY

A. Refer to Specification Section 27 05 00 for requirements.

3.13 FIELD SERVICES

A. Refer to Specification Section 27 05 00 for requirements.

3.14 TRAINING

A. Refer to Specification Section 27 05 00 for requirements.

3.15 PROJECT CLOSEOUT REQUIREMENTS

A. Refer to Specification Section 27 05 00 for requirements.

END OF SECTION 27 10 10

PART 1 - GENERAL

1.1 STIPULATIONS

A. Project drawings and general provisions of the Contract, including but not limited to all; General and Supplementary Conditions, Division 01 Specification Sections and stipulated Specification Sections shall apply to this and all related Division 27 Specification Sections.

B. Related Specification Sections:

1. Refer to Specification Section 27 05 00 for a complete list of related specification sections.

C. Reference Symbols:

1. All device symbols are defined by the appropriate symbol schedule on the symbols and abbreviations sheet in the systems drawing package. Not all device symbols indicated may be required for the project.
2. Because of the scale of the drawings, symbols are shown on drawings as close as possible to the mounting location. Contractor shall coordinate exact locations with all drawings and affected trades prior to submittal of shop drawings.

   a. The installing Contractor shall coordinate exact locations with all security and telecommunications drawings and site plan drawings as well as all affected trades prior to submittal of any shop drawings.

D. Abbreviations:

1. Refer to Specification Section 27 05 00 for requirements.

E. Definitions:

1. Refer to Specification Section 27 05 00 for requirements.

1.2 SUMMARY

A. Refer to Specification Section 27 05 00 in addition to the following.

B. The intent of this specification is to establish a standard of quality, functionality, and features for the installation of a new Wireless Local Area Network System (WLAN) throughout the new satellite concourse 'C' for Destin Fort Walton Beach Airport. The WLAN shall provide wireless network connectivity to passengers, Authority staff and personnel, tenants, and other stakeholders as well as specified building systems in areas of the new satellite concourse 'C' for Destin Fort Walton Beach Airport identified in the Contract Documents.

C. Refer to the contract drawings for Wireless Access Point (WAP) and related device placement.

D. The Contract Drawings are diagrammatic in nature and reflect the design intent and approximate signal coverage and density. The Contractor shall generate an RF "heat map" model and submit to the County for approval in order to finalize WAP locations. Refer to SUBMITTALS within this Section for additional information.

1.3 SCOPE OF WORK

A. Refer to Specification Section 27 05 00 in addition to the following.

B. The Contractor shall furnish and install all cabling, cable terminations, conduits/raceways, racks, cabinets, commissioning, and testing of all network communications cabling and equipment in accordance with all related Division 27 Specification Sections.

a. The Contractor shall have a registered RCDD professional review and seal all system shop drawings demonstrating industry standard design, installations and certifications of all structured cabling networks related to the installation and operation of the Wireless Local Area Network System.

b. Refer to Specification Sections 27 05 00 and 27 10 00 and for all TCP/IP based system cabling requirements

1.4 REFERENCES

A. Refer to Specification Section 27 05 00 for requirements.

1.5 SYSTEMS DESCRIPTIONS

A. Refer to Specification Section 27 05 00 for requirements.

1.6 SUBMITTALS

A. Refer to Specification Section 27 05 00 for requirements in addition to the following.

B. The Contract Drawings detail typical mounting conditions and do not necessarily reflect all possible mounting configurations. The Contractor shall submit all WAP mounting details as part of Shop Drawings.

C. Mock-Ups

1. Prepare mockups for each wireless access point mounting type using approved mounting brackets and wireless access points. Mock-ups shall comply with the following requirements:

a. Demonstrate means of securing the WAP and bracket/housing to the structure.

b. Demonstrate the appearance and finish of the installed products.

2. Mock-Ups shall encompass the following:

a. Wall Mount: Construct a 2'x2' section of wall to match the actual mounting surface.

b. Ceiling Mount: For each mock-up, include a 2'x2' section of the ceiling finish to which WAP will be mounted. If the ceiling consists of prefabricated panels or tiles, utilize a tile or panel for the mock-up. If the WAP is to be mounted to a supporting grid or system, demonstrate attachment to the grid in the mock-up.

c. Specialized Mounts: For all other mounting conditions, construct a mock-up that demonstrates the structural and aesthetic features specified.

3. RF Coverage Modeling

a. Prior to the submission of shop drawings, the contractor shall perform an analysis of the coverage offered by the Wi-Fi antenna locations submitted in the shop drawings. Coverage prediction maps shall be submitted prior to the start of system installation, including any conduit installation to antenna locations. Installation shall not proceed until submittal has been approved by the Authority. All shop drawings shall reflect all WAP locations based on this RF Coverage Model. The RF Coverage Model shall establish the final design.

1.7 QUALITY ASSURANCE

A. Refer to Specification Section 27 05 00 for requirements.

1.8 DELIVERY STORAGE AND HANDLING

A. Refer to Specification Section 27 05 00 for requirements.

1.9 RECORD DOCUMENTS

A. Refer to Specification Section 27 05 00 in addition to the following:

1. Provide floor plans indicating the location of each WAP and unique identification number associated with MAC address and serial number of each device.

1.10 OPERATIONS AND MAINTENANCE

A. Refer to Specification Section 27 05 00 for requirements.

1.11 SOFTWARE AGREEMENT

A. Refer to Specification Section 27 05 00 for requirements.

1.12 SPARE MATERIAL

A. Refer to Specification Section 27 05 00 for requirements.

1.13 ENVIRONMENTAL CONDITIONS

A. Refer to Specification Section 27 05 00 for requirements.

PART 2 - PRODUCTS

2.1 MANUFACTURED PRODUCTS

A. Refer to Specification Section 27 05 00 for requirements.

2.2 SYSTEM REQUIREMENTS

A. The Contractor shall provide WLAN system configuration shall include, but not be limited to, the following:

1. All network configuration tasks including, but not limited to, assignment of IP addresses or configuration of DHCP as directed by the Authority.
2. Setup of system administrative features such as traffic monitoring, security/firewall settings, and other functions as directed by the Authority.
3. Configuration of public WLAN such that users encounter a seamless experience at the new replacement terminal.
4. Configuration of additional BSSIDs for various tenant users and stakeholders as directed by the County.
5. Adjustment of WAP locations, antenna orientation and configurations to achieve the desired signal coverage, throughput, and wayfinding functionality in areas of the terminal as specified in the contract documents. The Contractor shall continue to provide adjustments until performance is achieved to the satisfaction of the Authority at no additional cost to the County.

B. Contractor shall coordinate with the County to ensure proper, vendor-certified and approved configuration and performance of the WLAN in accordance with the manufacturer's published system and device documentation and all requirements of the Contract Documents.

2.3 SOFTWARE REQUIREMENTS

A. Refer to specification 27 05 00 for additional information.

B. Provide all WLAN management software as required for a complete and functional WLAN.

2.4 HARDWARE REQUIREMENTS

A. Wireless Access Points (WAPs)

1. Capabilities:

a. Access points shall be PoE (802.3at) compliant

b. Co-existence with emerging 5G technologies, IoT and cellular network offloading

c. Leverage Wi-Fi infrastructure to observe passenger flow and derive business analytics and Key Performance Indicators (KPIs)

d. Encryption: Advanced Encryption Standard (AES), Wi-Fi Protected Access 2 (WPA2), WPA, 802.11i, 802.11X

e. Wireless Standards: 802.11ax and backwards compatible with 802.11ac/n/g/a/b

2. Indoor Omnidirectional WAPs shall, at a minimum, meet the following feature requirements:

   a. Dual radios, 2.4GHz and 5GHz frequency bands

   b. Single-User, Multi-Input Multi-Output (SU-MIMO) and Multi-User, Multi-Input Multi-Output (MU-MIMO) with up-link and down-link support

   c. 5GHz Radio transmission:

      1) (2) or (4) spatial streams for up to 4 x 4 MIMO
      2) SU-MIMO and DL MU-MIMO support
      3) 3.6 Mbps to 4,803 Mbps (MCS0 to MCS11, NSS = 1 to 4, HE20 to HE160)

   d. 2.4GHz Radio transmission:

      1) (2) spatial streams SU-MIMO
      2) SU-MIMO and DL MU-MIMO support
      3) 3.6 Mbps to 574 Mbps (MCS0 to MCS11, NSS = 1 to 2, HE20 to HE40)

   e. Maximum connected devices per radio: 256

   f. Maximum number of BSSIDs: 16

   g. Maximum aggregate transmit power: +24dBm (2.4GHz), +24dBm (5GHz)

3. Indoor Omnidirectional WAPs shall be Aruba, Cisco, or approved equal.
4. Outdoor Omnidirectional WAPs shall, at a minimum, meet the following feature requirements in addition to those listed under Indoor Omnidirectional WAPs above:

   a. Operating Temperature: Temperature: -40° C to +70° C (-40° F to +158°F)

   b. IP67 and NEMA 4X rated included housing

   c. Outdoor Omnidirectional WAPs shall be Aruba, Cisco, or approved equal.

5. Outdoor Directional WAPs shall, at a minimum, meet the following feature requirements in addition to those listed under Outdoor Omnidirectional WAPs above:

   a. Integrated directional antenna gain:

      1) 6.3 dBi @ 2.4 GHz (90° Vertical x 90° Horizontal)
      2) 6.5 dBi @ 5.x GHz (90° Vertical x 100° Horizontal)

   b. Outdoor Omnidirectional WAPs shall be Aruba, Cisco or approved equal.

B. WLAN Controllers

1. WLAN Controllers shall provide the overall administration and management functionality for the WLAN. Controllers shall be designated as "master" and "slave" controllers depending on the logical and physical location of the controller within the system. At a minimum, controllers shall comply with the following requirements:

    a. Physical Form Factor & Connectivity

        1) 1RU rack mount enclosure
        2) (4) 10GBase-X SFP+ Ports
        3) (1) USB 2.0
        4) (1) RJ-45 Console Port
        5) Operating environment: 0 to 40 deg. Celsius, 5 to 95% relative humidity (non-condensing)

    b. Functionality

        1) Maximum connected WAPs: 2,000
        2) Maximum concurrent connected devices: 32,000
        3) Maximum supported VLANs: 4,094
        4) Maximum concurrent GRE tunnels (BSSIDs): 32,768
        5) Wired throughput (large packets): 40Gbps

2. Provide all SFP+ modules and accessories as required to connect the WLAN controllers to the County's PON.
3. WLAN controller shall be Aruba, Cisco, or approved equal.

C. WAP Housings

1. Contractor shall furnish and install housings as specified below.

    a. Right-angle Wall Mount Housing

        1) Wedge-shaped housing capable of mounting WAP on a wall in a horizontal orientation
        2) Direct mounting over standard data outlet/back box
        3) 18-Gauge steel, white powder coat
        4) Locking, hinged cover for access to rear of access point and data outlet
        5) Support for Aruba, Cisco WAPs or approved equal
        6) Oberon model 1012-00 or approved equal.

    b. Suspended Tile Ceiling Housing

        1) 2'x2' lay-in ceiling tile form factor
        2) Extra deep backbox with single-gang electrical knock-out for electrical box mounting above ceiling
        3) White ABS plastic dome
        4) 25lb load capacity
        5) Compatibility with Aruba, Cisco WAPs or approved equal
        6) Oberon model 1077-WA-T or approved equal.

    c. Outdoor Locations

        1) AP's mounted outdoors shall be manufactured with outdoor rated housings.

d. Other housing form factors as required to protect the WAP from the surrounding environment, restrict access to authorized personnel, and to match the surrounding architectural features. Housings shall be as manufactured by Oberon or approved equal.

PART 3 - EXECUTION

3.1 COORDINATION

A. Refer to Specification Section 27 05 00 for requirements.

3.2 EQUIPMENT PROTECTION

A. Refer to Specification Section 27 05 00 for requirements.

3.3 WORK PERFORMANCE

A. Refer to Specification Section 27 05 00 in addition to the following:

1. Refer to related specification sections for additional project coordination requirements. In addition to the requirements defined in this specification section, the Contractor shall coordinate and meet all requirements addressed in Division 26, Division 27 and Division 28 specification sections.
2. The Contractor shall supply all end-user cabling and connectivity components for interconnection of system equipment. This shall consist of, but not be limited to:

   a. The installation of hybrid fiber optic/copper cabling from communications rooms (IDFs/MDFs) to all ONTs supporting WAPs.

   b. The installation of Category 6 UTP patch cords for interconnection from ONTs to WAPs

   c. The installation of single mode fiber optic and Category 6 UTP patch cords in communications rooms to connect equipment associated with the WLAN.

3. At the time of shop drawing submission, the Contractor shall provide a wireless coverage heat map drawing documenting the overall RF design intent indicating maximum operating ranges between an WAP (fixed location) and mobile stations at a specified transmission power level. Include all adjacent wireless access channel assignments for each WAP.

   a. The heat map shall also identify potential coverage shortfalls due to multi-path, interference sources, and interference from other wireless installations.

   b. Prior to the installation of any wireless access point enclosures the Contractor shall conduct and document a real time RF site survey to determine the maximum operating range between an AP (fixed location) and mobile stations for a specified transmit power level. Survey shall also identify holes of coverage due to multi-path, interference sources, and interference from other wireless installations.

c. Final termination, and testing, of all data communications and wireless network equipment shall be under the direct supervision of the appropriate system integrator. The integrator shall be an accredited and authorized distributor of the appropriate equipment manufacturer and shall be fully certified in the installation, programming, testing, and commissioning, of all equipment, devices, components, and/or systems being provided as part of this project.

3.4 INSTALLATION REQUIREMENTS

A. Refer to Specification Section 27 05 00 for requirements in addition to the following:

1. The Contractor shall assign a unique device identifier associated with each device's MAC address and manufacturer serial number.

3.5 COMMUNICATIONS CABLING REQUIREMENTS

A. Refer to Specification Section 27 05 00 for requirements.

3.6 ELECTRICAL POWER DISTRIBUTION

A. Refer to Specification Section 27 05 00 for requirements

3.7 TRANSIENT VOLTAGE SUPPRESSION

A. Refer to Specification Section 27 05 00 for requirements.

3.8 GROUNDING AND BONDING

A. Refer to Specification Section 27 05 00 for requirements.

3.9 EQUIPMENT IDENTIFICATION

A. Refer to Specification Section 27 05 00 for requirements.

3.10 MAINTENANCE & SERVICE

A. Refer to Specification Section 27 05 00 for requirements.

3.11 WARRANTY

A. Refer to Specification Section 27 05 00 for requirements.

3.12 FIELD SERVICES

A. Refer to Specification Section 27 05 00 for requirements.

3.13 TRAINING

3.14 REFER TO SPECIFICATION SECTION 27 05 00 FOR REQUIREMENTS. PROJECT CLOSEOUT REQUIREMENTS

A. Refer to Specification Section 27 05 00 for requirements.

END OF SECTION 27 10 15

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, and all related Specification Sections, shall all apply to this Section.

B. Related Specification Sections:

1. Refer to specification Section 27 05 00 for additional information.

C. Reference Symbols:

1. Refer to specification Section 27 05 00 for additional information.

D. Abbreviations:

1. Refer to specification Section 27 05 00 for additional information.

E. Definitions:

1. Refer to specification Section 27 05 00 for additional information.

1.2 SUMMARY

A. In addition to all requirements stipulated in specification 27 05 00 this section contains the overall requirements and design intent associated with all Division 27 requirements as it relates to the installation of equipment in the communication cabinet and equipment rooms to support the following systems:

1. Wireless Local Area Network (WLAN)
2. Multiuser Flight Information Display Systems (MUFIDS)
3. Distributed Antenna System (DAS) (Public Safety)
4. IPTV Distribution System
5. Public Announcement System (PA)
6. Building Lighting Controls
7. Access Control System (ACS)
8. Video Surveillance System
9. Digital Addressable Fire Alarm System

B. This section also addresses all requirements for submittals, quality assurance, product handling, record documents, project conditions, installation, system performance, demonstrations, testing, and certifications related to the installation of all equipment cabinets and communications room fit-out for this project. Refer to specification Section 27 05 00 for additional project requirements.

10. All symbols are shown on the contract drawings as close as possible to their intended location. Contractor shall coordinate the installation of all equipment cabinets, communications room fit-out as well as the connection to all communications equipment, devices, controls, components, and integration of systems as herein specified. The contractor shall document all coordination requirements with all affected trades and sub-contractors at the time of shop drawing submission.
11. Drawings for this work are diagrammatic and intended to convey the extent, general arrangement, and locations of the work. Because of the scale of the drawings, certain basic items such as access panels, conduits, cabinet sizes, penetration sleeves, pull boxes, back-boxes and junction boxes may or may not be shown on the contract drawings. Include all items where required by code and related specification sections as required for the proper installation of all equipment cabinets and communications room fit-out scopes of work

B. Use of Premises

1. Refer to specification Section 27 05 00 for additional information.

C. Coordination

1. Refer to specification Section 27 05 00 for additional information.

1.3 SCOPE OF WORK

A. Refer to related Division 27 specification sections, Division 28 specifications sections, Division 26 specifications sections and Contract Drawings including all project scopes of work impacted by all horizontal cabling infrastructures, related to the connectivity of all network equipment, components and systems.

1. At the minimum, the scopes of work covered as herein specified shall include but are not limited to all necessary labor, equipment, material, cabling, conduits, commissioning, and testing as well as all appurtenances as required for the proper installation necessary to deliver fully functional horizontal cabling infrastructures in support of all related Division 26, Division 27 and Division 28 systems.
2. It shall be the Contractor's responsibility for full compliance with all requirements of 27 05 00 as well as all related specification sections as required to deliver all equipment cabinets and communications room fit-outs in accordance with the requirements of all Contract Documents.

a. It is the design intent for the design, furnish and install all equipment cabinets and communications room fit-outs as necessary to provide the required connectivity of the Structured Cabling System (SCS) supporting all data ports, VoIP telephones,

video displays, wireless access points, paging microphones, kiosks, cameras, as well as all ancillary and/or integrated systems.

a) Refer to Specification Section 27 05 00 for additional information related to all requirements for product substitutions and/or deviations for from the Contract Documents.

b. The Contractor shall furnish and install all equipment cabinets and communications room fit-outs to properly support the installation of all horizontal cabling, conduits/pathways, field devices, communication room fittings, equipment, grounding, cable terminations, connections to electrical power, testing and labeling, appurtenances and system integrations as herein specified as well as all related specification sections.

3. The County does not share MDF/IDF space with any other tenant and shall be separated by a physical barrier be it a fence or wall. All tenant and/or agency communication systems cabling and equipment shall be installed in non-County controlled areas segregated within the communications room space. This shall apply to all tenants and/or agencies that do not have a dedicated MDF or IDF space for their individual communications systems.

1.4 REFERENCES

A. Refer to specification section 27 05 00 for additional information.

1.5 SUBMITTALS

A. In addition to the submittal requirements as stipulated by Division 01, Specification Section 27 05 00 as well as all related specifications sections, the Contractor shall also conform with the following submittal requirements.

1. Contractor shall submit the proposed layout for each communications room in the airport. This should be in accordance with the drawings in for a "typical" room layout and is required for every room.
2. The contractor will need to submit proposed layout and as-build drawings that depict the complete layout of each communications room prior to implementation.
3. Shop Drawings and Systems cutover schedules for all services to be submitted and approved before implementation is started.
4. Record Drawings: Furnish Revit drawings of all installed equipment within each communications room.
5. Include spare parts list for approval by County.

1.6 QUALITY ASSURANCE

A. In addition to the requirements as stipulated by Specification Section 27 05 00 as well as all related specifications sections, the following shall also apply:

B. The Contractor shall furnish, erect, install, connect, clean, adjust, test and condition all manufactured articles, materials, and equipment, and place in service in accordance with the

manufacturer's directions and recommendations unless otherwise indicated by the Contract Documents.

1. Submit certified documentation that the following experience requirements are in conformance.

   a. Contractor Qualifications

      1) The contractor shall be certified by the manufacturer of the products, adhere to the engineering, installation and testing procedures and utilize the authorized manufacturer components and distribution channels in provisioning this Project.
      2) Must be supervised on-site by a BICSI RCDD. Must demonstrate knowledge and compliance with all BICSI, TIA, UL, and NEC methods, standards and codes.
      3) All members of the installation team shall be certified by the manufacturer as having completed the necessary training to complete their part of the installation. Resumes of the entire team shall be provided along with documentation of completed training courses.
      4) The contractor shall provide five references for projects of equivalent scope, type and complexity of work completed within the last five years

1.7 DELIVERY, STORAGE AND HANDLING

A. Refer to specification Section 27 05 00 for additional information.

1.8 RECORD DOCUMENTS

A. In addition to the requirements as stipulated by Specification Section 27 05 00 as well as all related specifications sections, the following shall also apply:

   1. All equipment cabinets and communications room fit-out designs as well as all related appurtenances shall be indicated on enlarged communication room layouts drawn to scale and provided accurate information for use in the future when changes are made and the exact location of cables are required to avoid service interruptions.

      a. Floor plans showing exact equipment cabinet and communications room locations as we as all related appurtenances and connected ancillary equipment and/or systems, shall be marked with cable identifiers. Refer to specification section 27 05 53 for additional information.

         1) A complete diagram of all cable tray, conduits and conduit sleeves equipment cabinets, grounding terminations, backboards and all appurtenances.

      b. All as-built Drawings and Documentation shall be reviewed, approved and stamped by Contractor's on-site RCDD prior to submission to County for final acceptance.

1.9 OPERATION AND MAINTENANCE

A. Refer to specification Section 27 05 00 for additional information.

1.10 AS-BUILT DRAWINGS

A. In addition to the requirements as herein stipulated under "Record Documents," and Specification Section 27 05 00 as well as all related specifications sections, the following shall also apply:

1. All communications room layouts shall be placed on these plans so that all equipment cabinets, cable trays, grounding connections, backboards and all appurtenances are to scale and provide accurate information for use in the future when changes are made and the exact location of cables are required to avoid service interruptions. At the minimum include the following:

a. As-built Drawings and Documentation shall be reviewed, approved and stamped by Contractor's on-site RCDD.

1.11 SOFTWARE AGREEMENT

A. Not Applicable

1.12 EXTRA MATERIAL

A. Not Applicable

1.13 ENVIRONMENTAL CONDITIONS

A. Refer to specification Section 27 05 00 for additional information.

1.14 ENVIRONMENTAL CONDITIONS

A. Refer to specification section 27 05 00 for addition information.

PART 2 - PRODUCTS

2.1 MANUFACTURED PRODUCTS

A. In addition to all requirements as stipulated by Specification Section 27 05 00 as well as all related specifications sections, the following shall also apply:

1. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, that meet and/or exceed the specified performance and features of the equipment and/or systems and for which replacement parts shall be readily available to the contractor and/or County.

a. The equipment specified is based on the acceptable manufacturers previously listed. Where "or equal" is stated, equipment shall be equivalent in every way to that of the equipment specified, and subject to approval by the County.

1) When more than one unit, device, or component of the same class of equipment is required, such units, devices, or components shall be the product of a single manufacturer.

2. Acceptable manufacturers for each component shall be as specified and shall be provided in full compliance with the requirements of this and all related specification sections and contract drawings.

a. Manufacturers listed as acceptable shall not negate the contractors' responsibility for providing all equipment, components, and/or appurtenance in accordance with all requirements of the Contract Documents.

1) Where manufacturer and/or manufacturer model numbers reference specific system components in the related specification sections, it is to establish the performance requirements and quality of the systems and components only.

a) It is in no way an inference that the referenced model numbers are the manufacturer's current product and are the only manufacturer's acceptable components for this project unless specifically referenced as "no substitutions."

3. Identifiers, Labels and Labeling System

a. All Identification and Labeling shall follow Specification: 27 10 00 – Structured Cabling System.

4. Any deviation from the specification must be approved prior to the submission of shop drawings.

2.2 TWO-POST RACKS

A. Seven-foot double-sided, high cable density style relay rack shall comply with following specifications:

1. 19" rack width
2. Double-sided universal mounting spacing
3. #12-24 panel mounting holes
4. Conformance to TIA-310-D
5. Twin 2" x 2" top angles
6. Self-squaring with tapped assembly holes
7. Material: 6061-T6 aluminum alloy
8. Provide Horizontal and Vertical wire management
9. Finish: Black Finish
10. Part number: NetShelter AR201
11. Isolation kit for mounting

B. Power Distribution Units (PDU)

1. Provide two (2) PDU. The switched Rack Metered PDUs NEMA L6-30P input and NEMA L6-30R AP89410, Rack PDU 2G, Switched, ZeroU, 30A, 200/208V, (21) C13 & (3) C19.
2. All Cabinets/Rack are to have a 24-port standard RJ45 patch panel installed with 12 ports cabled back to the Horizontal cable cabinet on an iPatch panel.

2.3 FREE STANDING VERTICAL EQUIPMENT CABINETS

A. Manufacturer: Chatsworth F Series Gen 3 cabinets or County approved.

1. Refer to Specification Section 27 05 00 for all substitution requirements.

B. General

1. The work covered here consists of the furnishing of all necessary labor, supervision, materials, accessories, parts, equipment, and services to provide and install a complete freestanding equipment cabinet.
2. The standard freestanding equipment cabinets are defined to include, but not limited to, cabinet frames, cabinet front and rear doors, top and side panels.
3. All internal cabinetry hardware shall be 19-inch rack mountable.
4. Provide and install freestanding vertical cabinets, with hinge placement as indicated in the Drawings.
5. Provide vertical and horizontal wire management for all cabinets
6. All cabinets shall have padlock eyes installed on front and back cabinet doors.

a. All Cabinets/Rack are to have a 24-port standard RJ45 patch panel installed with 12 ports cabled back to the Horizontal cable cabinet on an iPatch panel.

C. Standard Network Cabinet:

1. Cabinets shall be fully assembled by the manufacturer with the components listed below. Individual component part numbers provided for information only.

a. Chatsworth part # TS1023813 – 45RU; 800mm W; 1075mm D; F Series Gen 3:

1) 12-24 Tapped sliding rails / 2-pair
2) Single perforated metal front door with swing latch w/padlock feature
3) Double perforated metal rear door with swing latch w/padlock feature
4) Network / One-piece / 4 cable openings
5) Two solid two piece side panels
6) 6-slide

a) (4) Vertical Ring cable managers installed one on each corner (39087-E02)
b) (2) Full height PDU brackets installed one each left and right rear corners of cabinet (39086-E03)

7) Glacier white

a) All Network cabinets to have 24 iPatch panel installed. Refer to related Specification 27 15 00 for additional information.

8) PDU Power Strips:

a) Core Switch Cabinet: Provide (2) Chatsworth Vertical eConnect Monitored Pro PDUs (Part # P4-1F0C3) Input NEMA L6-30P; Output (18) C13s and (6) C19s. And (1) Horizontal Metered Power Strip (Part # 13239-755) Input NEMA 5-20P; Output (12) NEMA 5-20R. (Part # 13239-755)
b) All other Network Cabinets: Provide (2) Chatsworth Vertical eConnect Monitored Pro PDUs L5-30P input; output (24) 5-20Rs (Part # P4-1D0A5)

9) Grounding Bus Bar:

a) Provide Rack-Mounted Ground Bar. Refer to Specification 27 05 26

D. Standard Server Cabinet:

1. Cabinets shall be fully assembled by the manufacturer with the components listed below. Individual component part numbers provided for information only.

a. Chatsworth part # TS1023812 – 45RU; 600mm W; 1200mm D; F Series Gen 3

1) Square-punched rails / 2-pair
2) Single perforated metal front door with swing latch w/padlock feature
3) Double perforated metal rear door with swing latch w/padlock feature
4) Server / Two -piece / 4 cable openings
5) Two solid two piece side panels
6) 6-slide
7) (4) Vertical Ring cable managers installed one on each corner (39087-E02)
8) (2) Full height PDU brackets installed one each left and right rear corners of cabinet (39086-E03)
9) Glacier white

a) All Server cabinets to have 24 patch panel installed. See Specification 27 15 00 PDU

b. PDU Power Strips:

1) Server Cabinet: Provide (4) Chatsworth Vertical eConnect Switched Pro PDUs Input NEMA L6-30P; Output (18) C13s and (6) C19s. (Part # P6-1F0C3).

c. Grounding Bus Bar:

1) Provide Rack-Mounted Ground Bar. Refer to Specification 27 05 26.

E. Data Center Network cabinet:

1. Cabinets shall be fully assembled by the manufacturer with the components listed below. Individual component part numbers provided for information only.

a. Chatsworth part # TS1023649 – 45RU; 800mm W; 1200mm D; F Series Gen 3

1) 12-24 Tapped sliding rails / 2-pair
2) Single perforated metal front door with swing latch w/padlock feature
3) Single Solid metal rear door with swing latch w/padlock feature
4) Vertical Exhaust Duct System 34in-60in H (863mm-1523mm)
5) Network / One-piece / 4 cable openings
6) Two solid two piece side panels
7) 6-slide
8) (4) Vertical Ring cable managers installed one on each corner (39087-E02)
9) (2) Full height PDU brackets installed one each left and right rear corners of cabinet (39086-E03)
10) Bottom Panel Installed
11) Air Detector Installed
12) No Casters
13) No Leveling Feet
14) Glacier white

a) All Network cabinets to have 24 iPatch panel installed. See Specification 27 15 00

b. PDU Power Strips:

1) Data Center Switch Cabinet: Provide (2) Chatsworth Vertical eConnect Switched Pro PDUs Input NEMA L6-30P; Output (18) C13s and (6) C19s. (Part # P6-1F0C3)
2) In addition, provide: (1) Horizontal Metered Power Strip Input NEMA 5-20P; Output (12) NEMA 5-20R. (Part # 13239-755).

c. Grounding Bus Bar:

1) Provide Rack-Mounted Ground Bar. Refer to Specification 27 05 26.

F. Data Center Server Cabinet:

1. Cabinets shall be fully assembled by the manufacturer with the components listed below. Individual component part numbers provided for information only.

a. Chatsworth part # TS1023645 – 45RU; 600mm W; 1200mm D; F Series Gen 3

1) Square-punched rails / 2-pair
2) Single perforated metal front door with swing latch w/padlock feature
3) Single Solid metal rear door with swing latch w/padlock feature
4) Vertical Exhaust Duct System 34in-60in H (863mm-1523mm)
5) Server / Two -piece / 4 cable openings
6) Two solid two piece side panels
7) 6-slide
8) (4) Vertical Ring cable managers installed one on each corner (39087-E02)
9) (2) Full height PDU brackets installed one each left and right rear corners of cabinet (39086-E03)
10) Bottom Panel Installed

11) Air Detector Installed
12) No Casters
13) No Leveling Feet
14) Glacier white

a) All cabinets to have 24 patch panel installed. See Specification 27 15 00 PDU

b. PDU Power Strips:

1) Server Cabinet: Provide_(4) Chatsworth Vertical eConnect Switched Pro PDUs Input NEMA L6-30P; Output (18) C13s and (6) C19s (Part # P6-1F0C3)

c. Grounding Bus Bar:

1) Provide Rack-Mounted Ground Bar. Refer to Specification 27 05 26.

2.4 Standard Wall Mount Equipment Cabinet:

A. Manufacturer: APC or County approved.

1. Refer to Specification Section 27 05 00 for all substitution requirements

a. NetShelter part # AR100HD-WX swing-out 13 RU wall mount cabinet

1) External Dimensions: 25.75"H x 23"W x 24.25"D.
2) Internal Dimension: 22.75"H x 19"W x 19"D.
3) Net Weight: 94 lbs. (42.74 kg)
4) Weight Capacity (static load): 200 lbs. (90.91 kg.)
5) Minimum Mounting Depth: 9.45 in. (240 mm.)
6) Rack Height: 13U.
7) Color: Black.
8) Standards: TIA-310-D.

b. PDU Power Strips:

1) Provide: (1) Horizontal Metered Power Strip Input NEMA 5-20P; Output (12) NEMA 5-20R. (Manufacturer Recommended).

c. Grounding Bus Bar:

1) Provide Rack-Mounted Ground Bar. Refer to Specification 27 05 26.

2.5 Co-location Cabinets

A. Three compartment Co-Location equipment cabinet

1. Manufacturer: Chatsworth Part #TS1034205 Rev B or County approved.

a. Dimensions – 23.62” W x 31.49 D

b. 12-24 Tapped sliding rails / 2-pair
c. Single perforated metal front doors (with beam) per compartment
d. Single perforated metal rear door per compartment; swing handle latches, with hasp lock
e. Standard top panel
f. Glacier white finish

1) All cabinets to have 24 patch panel installed. See Specification 27 15 00 PDU

g. PDU Power Strips:

1) Cabinet: Provide: (1) Horizontal Metered Power Strip Input NEMA 5-20P; Output (12) NEMA 5-20R. (Part # 13239-755).

h. Grounding Bus Bar:

1) Provide Rack-Mounted Ground Bar. Refer to Specification 27 05 26.

B. Two compartment Co-Location equipment cabinet

1. Manufacturer: Chatsworth Part #TS1034203 Rev B or County approved.

a. Dimensions – 29.22" W x 31.49 D
b. 12-24 Tapped sliding rails / 2-pair
c. Single perforated metal front doors (with beam) per compartment
d. Single perforated metal rear door per compartment; swing handle latches, with hasp lock
e. Standard top panel
f. Glacier white finish

1) All cabinets to have 24 patch panel installed. See Specification 27 15 00 PDU

g. PDU Power Strips:

1) Cabinet: Provide: (1) Horizontal Metered Power Strip Input NEMA 5-20P; Output (12) NEMA 5-20R. (Part # 13239-755).

h. Grounding Bus Bar:

1) Provide Rack-Mounted Ground Bar. Refer to Specification 27 05 26.

2.6 WALL BACKBOARDS

A. In addition to all requirements as stipulated by Specification Section 27 05 00 the following shall also apply:

1. All walls in telecommunication rooms (MDF/IDF's, Tenant etc.) will be covered with ¾ inch plywood installed in 4 x 8 sheets.
2. Plywood shall be A/C grade or better void-free with A grade side facing out.

3. Plywood shall be and either fire-rated or treated on all sides with at least 2 coats of fire-resistant light-colored paint. Fire-retardant plywood is also generally acceptable.
4. Plywood to be installed 6 inches above finished floor or raised deck.

2.7 IDENTIFIERS, LABELS AND LABELING SYSTEM

A. All Identification and Labeling shall follow Specification: Section 27 05 53. Any deviations from the specification must be approved prior to the submission of shop drawings in accordance with all requirements of specification Section 27 05 00.

PART 3 - EXECUTION

3.1 COORDINATION

A. In addition to all requirements as stipulated by Specification Section 27 05 00 as well as all related specifications sections, the following shall also apply:

1. The contractor shall coordinate with the appropriate trade all conditions impacting the installation of communications cabinets, appurtenances as well as all equipment room layouts. including but not limited to all equipment locations, grounding connections, cable trays, ceilings, lighting fixtures, fire protection piping, and ductwork layouts to the satisfaction of all concerned trades, subject to final review by the County.

   a. At the minimum, the Contractor shall verify the following requirements prior to the installation of any equipment.

      1) At the time of shop drawing submission, the Contractor shall demonstrate that coordination with all affected trades was performed. Failure to properly document these coordination requirements as part of the shop drawing submission shall result in all shop drawings being returned for resubmission;
      2) Coordinate the installation of any structural reinforcement and/or blocking of all studded walls as required to properly install and support the installation of all wall mounted communications equipment cabinets.

   b. Where communications rooms are shared with cabling, equipment/systems, of any Tenants, and/or Agencies that appropriate physical separation barriers have been installed.
   c. That all conduits, raceways, and boxes are properly laid out in accordance with BISCI recommended practices, ANSI/TIA 569B standards, and the Contract Documents.
   d. All fire suppression and alarm systems have been properly planned for and have been incorporated in the overall communications room layouts.
   e. All ceiling protrusions have been placed to assure a minimum clear height of 8 feet 6 inches to provide space over the equipment frames for cables and suspended racks
   f. All communication room doors shall meet the following minimum requirements;

      1) All doors are a minimum of 3 feet wide by 6 feet, 7 inches tall.

a) If it is anticipated that large equipment will be delivered to the MDF, 6 feet wide by 7 feet, 5 inches tall shall be required.

2) All doors are keyed separately from other facility keys.

a) In addition, all doors shall be equipped with electronic access control and shall limited to only IT personnel and authorized vendors.

3) All Doors shall open outward and be lockable.
4) Access shall allow for future equipment changes.
5) Doors shall be fire rated for a minimum of one hour, or more as required by local Authority Having Jurisdiction (AHJ).

g. Signage is consistent with Destin Fort Walton Beach Airport System
h. The communications room floor is sealed concrete or tile to minimize dust and static electricity. (Carpet shall be strictly prohibited).
i. All HVAC systems are capable of providing environmental conditioning (24 hours per day, 365 days per year)

1) Heating, ventilation, and air conditioning sensors and control equipment are located in the MDF/IDF.
2) Positive air pressure differential is maintained with respect to surrounding areas.
3) The room temperature is between 64°F and 75°F, with a relative humidity between 30% and 55%.
4) Contractor shall provide heat load analysis for all equipment cabinets at the time of shop drawing submission.

j. Energy Efficient Lighting with occupancy sensor has been included in each communications room layout.

1) Lighting to provide a minimum equivalent of 50 foot-candles when measured three feet above finished floor.
2) All light fixtures shall be mounted a minimum of 8 feet, 6 inches above the finished floor
3) All light switches are located near the entrance of the MDF/IDF.
4) Power for the lighting is from the same circuits as power for the telecommunications equipment.
5) Emergency lighting has properly been placed that an absence of primary lighting will not hamper emergency exit.

k. Each MDF/IDF equipment cabinet is equipped with a minimum of two dedicated electrical circuits appropriately sized for equipment to be installed.

1) Separate duplex 120V AC convenience outlets (for tools, test sets, etc.) have been installed at 18 inches above the finished floor at 6-foot intervals around perimeter walls.
2) All duplex outlets are on non-switched circuits and they shall be identified and labeled.

3) Each MDF/IDF room is provided with an electrical ground on a 4-inch or larger busbar as defined by NEC Article 250-71(b). The busbar shall be mounted 6 feet, 6 inches above the finished floor. Refer to Specification Section 27 05 26 for additional information.

l. All walls of MDF/IDF are lined with Trade Size 3/4-inch AC-grade plywood, 8 feet high. Plywood mounted vertically starting 6 inches above finished floor, securely fastened to the wall-framing members and is fire treated and painted with two coats fire-retardant paint.

m. That any MDF/IDF room is not located in any place that may not be subject to water or steam infiltration, humidity from nearby water or stream, heat, and any other corrosive atmospheric or environmental conditions.

n. That any MDF/IDF room is not located near electrical power supply transformers, motors, generators, x-ray equipment, radio transmitters, induction heating devices, and other potential sources of electromagnetic interference.

1) That any MDF/IDF room does not share space in or be located near or below electrical closets, boiler rooms, washrooms, janitorial closets, and storage rooms.

2. Coordinate exact location of all equipment with the County, as well as all affected trades and Tenants prior to the installation of any required horizontal cabling infrastructures, as well as all appurtenances.

a. Coordinate exact location(s) of all horizontal cabling infrastructures, as well as all appurtenances, conductors, conduits, cable trays, equipment, and/or devices with all architectural plans, reflected ceiling plans and affected trades prior to installation.

b. All horizontal cabling infrastructures, as well as all appurtenance installations requiring coordination with other trades the contractor shall provide all templates, backboxes and equipment anchor bolts for mounting or flush mounting preparation, (e.g. pedestals or other devices requiring mounting on walls, concrete pads or other materials). Coordinate delivery of templates and equipment anchor bolts to preclude any delay in the construction schedule or the work of the affected trade.

c. If installation of conductors, conduits, devices or components is performed prior to coordination with other trades, which interferes with work of other trades or operation and maintenance of the facility, make necessary changes to correct the condition at no additional cost to the County.

1) Verify liquid-carrying pipes are not installed in or above any IDF/MDF that has active electronic equipment. Do not proceed with installation in affected areas until removed

3. Provide coordination with all system sub-contractors and trades the proper installation of all horizontal cabling infrastructures, as well as all appurtenances necessary to provide fully functional horizontal cabling infrastructures in accordance with all applicable specification sections.

B. The Contractor shall maintain a complete set of current and up to date shop drawings and equipment submissions at the job site at all times. Shop drawings, equipment submissions and all other documents submitted for review shall be made available on site to the County upon request.

1. Coordinate any work scheduled to be provided by County that impact the scope of work associated with the horizontal cabling infrastructures requirements of this project. Schedule all work to ensure that the work of the County can proceed in accordance with the Project Schedule.

3.2 PREPARATION

A. In addition to all requirements as stipulated by Specification Section 27 05 00 as well as all related specifications sections, the following shall also apply:

1. Verify raceways, cable trays, boxes, are properly installed in accordance with specification sections 27 05 28 and all related specification sections.
2. Verify backboards are properly installed.
3. Verify telecommunications grounding system is properly installed and tested following Section 27 05 26.
4. Verify all structural reinforcement and/or blocking of all studded walls as required to properly install and support the installation of all wall mounted communications equipment cabinets.
5. Verify liquid-carrying pipes are not installed in or above any IDF/MDF that has active electronic equipment. Do not proceed with installation in affected areas until removed.
6. Verify that all fire proofing has been applied to all structural steel prior to the commencement of any work.

3.3 EQUIPMENT PROTECTION

A. Refer to specification Section 27 05 00 for additional information.

3.4 WORK PERFORMANCE

A. In addition to all requirements as stipulated by Specification Section 27 05 00 as well as all related specifications sections, the following shall also apply:

1. Final termination, and testing, of all horizontal cabling infrastructure connections in any equipment cabinets shall be under the direct supervision of the appropriate system integrator. The integrator shall be an accredited and authorized distributor of the appropriate equipment manufacturer and shall be fully certified in the installation, testing, and commissioning, of all equipment, devices, components, and/or systems being provided as part of this project.

a. For rack mounted equipment cabinets, the Contractor shall run power cables, control cables, and high-level cables on the left side of an equipment rack as viewed from the rear. The contractor shall run other cables on the right side of an equipment rack as viewed from the rear.

1) For equipment mounted in drawers or on slides, provide the interconnecting cables with a service loop of not less than three feet and ensure that the cable is long enough to allow full extension of drawer or slide.

b. All racks and cabinets shall be floor mountable by design and permanently fixed to the floor with bolt-down kits. Manufacturer's procedures for floor mounting should be followed. Multiple racks and cabinets shall be connected together directly or indirectly via horizontal cable management hardware as indicated by drawings.

1) A minimum of 2 feet shall be left at the end of the row of equipment bays. A minimum of 5 feet between walls and equipment bays will allow space for wall mounted copper cable terminations and the required 36" distance from equipment for work space.

B. Job site safety and worker safety is the responsibility of the Contractor. Ensure that safe access and egress from all work areas is maintained during movement and installation of materials. Clean up all debris generated by installation activities. Keep all areas free of debris at all times.

C. Pre-installation Conferences: Include provisions to attend all pre- installation conferences at Project site in compliance with all requirements in Division 01 Specification Section and as herein specified. Review methods and procedures related to installation and operations of all communications equipment cabinets, including, but not limited to, the following:

1. Review all Coordination requirements as herein specified related to all MDF/IDF room layouts responsible by other trades.
2. Review electrical and equipment roughing-in related to all horizontal cabling infrastructures as well as other preparatory work required to be performed by other trades.
3. Review all structural reinforcement and/or blocking of all studded walls as required to properly install and support the installation of all wall mounted communications equipment cabinets.
4. Review all work, equipment deliveries, installation procedures, and related scopes as required to conform to the phased construction schedule.
5. Review and finalize construction schedule and verify availability of materials, installation personnel, equipment, and any preparatory work by other trades needed to make progress and avoid delays.
6. Review required testing, and certifying procedures to be employed for each backbone, horizontal or grounding infrastructure connections prior to termination in any equipment cabinets or enclosures.

D. All new work shall be installed neatly and carefully disturbed or damaged work shall be replaced or repaired to its prior conditions, as required by Division 01 Specification Section.

E. Remove all unnecessary tools and equipment, unused materials, packing materials, and debris from each area where work has been completed unless designated for storage.

F. Coordinate the installation of all horizontal cabling entrances, conduits/raceways, conduit sleeves, cable trays as well as all appurtenances and equipment with the applicable trades to

ensure proper connectivity, functions and system performances in accordance with all related specification sections. Refer to Division 01 Specification Section for additional project coordination requirements.

1. Coordinate with all trades at the time of shop drawing submission detailing all conditions impacting the installation of communications equipment cabinets, cable trays, conduits, cable entrances, conduit sleeves, all appurtenances as well as all communication room layouts.

    a. The contractor shall coordinate with the appropriate trade all conditions impacting the installation any cabinet, conduit, cable tray or conduit sleeve including but not limited all communications rooms, equipment locations, to the satisfaction of all concerned trades, subject to final review by the County.

        1) Coordinate exact location(s) of all horizontal cabling entrances, infrastructures, conduits, equipment and/or device installations with all architectural plans, site plans, reflected ceiling plans and affected trades prior to installation.

            a) Equipment installations requiring coordination with other trades the contractor shall provide all templates, back- boxes and equipment anchor bolts for mounting or flush mounting preparation, (e.g. pedestals or other devices requiring mounting on walls, concrete pads or other materials). Coordinate delivery of templates and equipment anchor bolts to preclude any delay in the construction schedule or the work of the affected trade.

    b. If installation of any communications equipment cabinets and/or related appurtenances is performed prior to coordination with other trades, which interferes with work of other trades or operation and maintenance of the facility, make necessary changes to correct the condition at no additional cost to the County.

G. The Contractor shall maintain a complete set of current and up to date set of shop drawings and equipment submissions at the job site at all times. The Shop drawings and all other submissions shall be marked up to reflect all as-built conditions and shall be made available for review by the County upon request.

H. The Contractor shall prepare the necessary documents required for installing, all equipment cabinets and communications room layouts. Such documents include but are not limited to:

1. Project management and quality assurance plans
2. Testing plans
3. Component and system submittal documents
4. Installation plans
5. Component design plans
6. System user documentation
7. As-built drawings and documentation

I. The Contractor shall coordinate with the County to ensure that all equipment cabinets and communication room layouts meet the project requirements. The Contractor shall meet all ADA requirements.

3.5 INSTALLATION

A. Install in accordance with all requirements of the Contract Documents, specification section 27 05 00, all related specification sections, manufacturer's instructions and approved submittal data.

1. All installation shall be done in conformance with ANSI/TIA 568B standards, BICSI methods, Industry standards and cabinet manufacturer's installation guidelines.
2. The installation of all communication equipment cabinets shall comply with all applicable national and local codes pertaining to low voltage cable system installations.
3. The contractor shall adhere to the installation schedule of the general contractor and shall attend all construction meetings scheduled by the general contractor.
4. Upon structural completion of the communications room(s) and prior to the installation of any communications equipment or supporting devices inside the room, the CMAR shall consult the County in order to:

   a. Perform construction administration activities to compare as-built configuration to the design.
   b. Observe all "not-to-design" compliance issues and issue corrective advisement of actions.
   c. Upon completion of 1 and 2 above, the Communications Designer shall mark with masking tape the general layout of the equipment placement.

5. Vertical Cabinet Installation

   a. All Cabinets shall be properly positioned, leveled, ganged, anchored, grounded and powered.
   b. All Cabinets shall be populated in accordance with the requirements of the Contract Drawings and shall include but not limited to all termination hardware, equipment, proper patch cord lengths, and power outlets.
   c. Install and anchor all vertical equipment cabinets to floor following in accordance with the requirements of the Contract Drawings and manufacturer's instructions.
   d. All cabinets shall be properly ganged in each bay in accordance with the requirements of the Contract Drawings.
   e. All cabinet doors shall be configured as shown in accordance with the requirements of the Contract Drawings.
   f. All cabinets shall be properly labeled per specification 27 05 53.
   g. After final acceptance of the cabinets, coordinate with County to replace key/lock with silver barrel on front and back doors.
   h. All horizontal cable infrastructure installations shall comply with the following:

      1) Cables shall be neatly routed and properly secured.
      2) Minimum bending radius for copper cables shall not be exceeded.
      3) Closures shall be properly mounted and secured.
      4) Refer to Specification Section 27 13 00 and 27 15 00 for additional information.

i. All enclosures, entry and exit cabling shall be labeled per specification 27 05 53, easily visible from the finished floor.

6. Seismic Performance: The Contractor shall furnish and install all equipment bracing, and anchoring rated for the seismic zone of the geographical area in which the project resides, and shall withstand the effects of earthquake motion and wind forces in accordance with the current editions of the IBC and ASCE/SEI 7. Refer to Division 01 and Division 26 – Hangers and Supports for additional seismic information and requirements.

B. County or their designated representative shall randomly perform unannounced, on-site reviews during the installation. In addition, this person shall perform a final inspection and a complete review of the test results before the installation is accepted.

1. Upon completion of the installation, Contractor shall prepare as-built documentation of the entire SCS. This documentation shall be prepared in accordance with all requirements as herein specified as well as all requirements of Specification Section 27 05 00 and related specification sections of the of the Contract Documents.

C. Penetrations of Walls and Floors:

1. Refer to specification Sections 27 05 00 for additional information

3.6 ELECTRICAL POWER DISTRIBUTION

A. Refer to specification Section 27 05 00 for additional information.

3.7 TRANSIENT VOLTAGE SUPPRESSION

A. Refer to specification section 27 05 00 for additional information.

3.8 GROUNDING AND BONDING

A. Refer to specification Section 27 05 26 for all project grounding and bonding requirements.

3.9 EQUIPMENT IDENTIFICATION

A. In addition to all requirements as stipulated by Division 01 refer to related specification Section 27 05 53 for all labeling and identification requirements.

3.10 MAINTENANCE AND SERVICE

A. General Requirements

1. In addition to all associated requirements of 27 05 00 the following shall also apply.
2. After formal written acceptance of all horizontal cabling infrastructures the Contractor shall provide all services required to maintain all horizontal cabling infrastructures systems in fully operational state for the warranty period as specified by Division 01 as well as all related specification sections

a. Provide all necessary labor, materials and related appurtenances as required for performing scheduled adjustments or other non-scheduled work. Impacts on facility operations shall be minimized when performing scheduled adjustments or other non-scheduled work related to the installation and termination of all horizontal cabling infrastructures. Refer to Division 01 specification section for additional requirements.

3.11 WARRANTY

A. Refer to specification Section 27 05 00 for additional information.

3.12 FIELD SERVICES

A. In addition to all requirements as specified by Division 01, specification 27 05 00 as well as all related Division 27 Specification Sections, for the proper installation of all communication cabinets, associated appurtenances and communication room layouts. At the minimum, all scopes of work shall include but limited to the following requirements;

1. Test all grounding and bonding conductors prior to start-up and commissioning of any, horizontal cabling infrastructures, communications components, devices, equipment and/or systems.
2. Contractor Requirements

a. Contractor shall provide sufficient skilled labor to complete the installation and verification of conformance to all installation requirements related to communication equipment cabinets and communications room layout.

1) Contractor shall have a minimum of three years' experience installing communications equipment cabinets and associated appurtenances. All installers assigned by the Contractor to the installation shall be certified by the factory to install and test the provided products.

3. Adjustment, Correction, and Completion:

a. Correct deficiencies and retest all affected horizontal cabling infrastructures as well as all appurtenances.

1) Make necessary adjustments and modifications to all backbone and riser infrastructure installations after obtaining approval of the County

a) Completion: Performance verification test shall be complete when testing or retesting of each component has produced a positive result and has been approved in writing by the County or authorized representative.

b. Acceptance Requirements

1) Contractor's RCDD shall warrant in writing that 100% of the installation meets all requirements of Division 01, Specification 27 05 00 as well as all requirements as herein specified.

3.13 DEMOLITION

A. In addition to all requirements of Division 01, Specification Section 27 05 00 and all related specification sections the following shall apply.

1. The contractor shall be responsible for maintaining all communications service to areas of the building scheduled to remain in service during the period of renovation.
2. Where removal is indicated in Drawings, remove communications cable from termination point back to originating communications room, MDF or tenant communications room. Coordinate removal at all terminating blocks, panels cross-connects and patch cables with County prior to commencement of any work.
3. Demolition and removal of cabling shall not impact the operation of active systems.
4. Unless otherwise noted, discard all removed cable, patch cables and cross-connects. Except where re-routing of cable is specified in by the Contract Documents, do not reuse cable.
5. Remove all loose unterminated cabling to source found above ceiling, under floor or in wall.
6. All Demo shall include ALL Abandoned cables shall be removed in accordance with NEC 800.25.

3.14 TRAINING

A. General

1. Not Applicable

3.15 PROJECT CLOSEOUT REQUIREMENTS

A. Refer to specification Section 27 05 00 for additional information.

END OF SECTION 27 11 00

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions, of the Standard Contract Requirements for the Okaloosa County, Florida; General, Supplementary and Special Provisions to the Standard Contract, as well as Division 01 and all related Specification Sections, shall all apply to this Section.

B. Related Specification Sections:

1. Division 26 – Common Work Results for Electrical
2. Division 26 – Low Voltage Electrical Power Conductors and Cables
3. Division 26 – Grounding and Bonding for Electrical Systems
4. Division 26 – Hangers and Supports for Electrical Systems
5. Division 26 – Raceways and Boxes for Electrical Systems
6. Division 26 – Identification for Electrical Systems
7. Division 27 – Common Work Results for Communications Systems
8. Division 27 – Network Communications Systems

C. Reference Symbols

1. Because of the scale of the drawings, Public Address (PA) System integration, and connectivity objects are shown on drawings as close as possible to their mounting locations. Contractor shall coordinate the exact location of all systems, system integration, and network connectivity, with all related drawings, specification sections and affected manufacturers, prior to submittal of any shop drawings.

D. Abbreviations:

1. Refer to Specification Section 270500 and 271100 for additional information.

E. Definitions:

1. Refer to Specification Section 270500 for additional information.

1.2 SUMMARY

A. The intent of this specification is to establish a standard of quality, configuration, and operational requirements for the upgrades and modifications to the existing Public Address (PA) System. It shall be responsibility of the successful Contractor for the furnishing of all necessary system designs, installation, programming, licenses, commissioning, testing, and certifications in accordance with the requirements of the Contract documents.

B. All new equipment shall be as manufactured by Peavey MediaMatrix, and shall be part of the Peavey MediaMatrix family of products, no approved equal.

1. The overall scope of this project is the integration of the new Satellite Concourse 'C' Public Address system with the existing Peavey MediaMatrix Public Address system as indicated on the Contract Drawings.

    a. All amplifier frames, ambient noise sensor collectors, digital paging microphones and other related PA devices shall be connected back to the communications room as indicated on the contract drawings. New network switches shall connect to the existing network back to the existing PA system as indicated on the contract drawings.
    b. All new functional controls and operational features shall be replicated in the existing PA system.

C. In addition, the scope of work shall include but is not limited to all system components, active electronics, conduits, cabling, servers, software, software licenses, and all appurtenances as necessary to deliver a properly installed, fully operational Public Address (PA) system in accordance with all requirements of the Contract Documents.

D. The functional integration of the various systems shall include the capability to provide remote annunciation and control functions as herein described. Refer to the Contract drawings for additional information regarding system types and locations.

E. It shall be this Contractor's responsibility to sub-contract with the current PA System provider/integrator to provide all necessary coordination, equipment, and programming modifications to properly facilitate the full and seamless integration of the new Satellite Concourse 'C' PA system with the existing Peavey MediaMatrix PA system. Contact Michael Dimartinis of Elite Audio LLC at (856) 227-6800.

    1) The Contractor shall fully review and test to the satisfaction of DOA engineering and Owner's Representative that the new programming associated with the functionality of the existing TACS system has been properly replicated and is fully operational prior to downloading any programming to the new TACS equipment.

F. It shall be the Contractor's responsibility to become familiar with all existing conditions, system configurations, and program functions of the existing PA system prior to the commencement of any work. Refer to the Contract drawings for additional information.

G. The installation, performance, features, functions, software, and programming criteria, as specified herein, as well as all related specification sections, has been designed to offer the maximum system efficiency, ease of operation, occupant safety and the protection of equipment, as recommended by the Owner's Representative.

1. Any deviations from the specified criteria shall be documented, reviewed, and agreed to in writing by the Owner's Representative, prior to submission of bids. Refer to Division 01, and all related specification sections for product substitutions.

2. It is the responsibility of the contractor to ensure that the installed system meets or exceeds every standard set forth in these specifications. The contractor shall furnish all necessary system components and appurtenances, including, but not limited to, all necessary programming, licenses, testing, commissioning and certifications, as required, to provide a complete and fully operational PA system, whether specifically included in this section, or not.

    a. In addition, the Contractor shall provide all necessary modifications to the existing PA communications network, for the proper integration of all existing equipment to remain.
    b. The PA system and all related system integrations shall be furnished to the Owner as a complete, seamlessly operating, and fully functional system in full compliance with all contract document requirements.

3. The systems shall be complete, with all equipment as indicated on the contract drawings and/or described herein. The contractor shall turn over to the Owner a complete and fully operational communications network infrastructure, as required, to properly integrate, in a seamless manner, the new Satellite Concourse 'C' PA system.

    a. The system communications network shall, at the minimum, support the following network communications standards and protocols;

        1) 100Base-TX/FX, Fast Ethernet (IEEE802.3u).
        2) 1000Base-T, Gigabit Ethernet over twisted-pair copper (IEEE802.3ab)
        3) 1000Base-X, Gigabit Ethernet over fiber optic (IEEE802.3z).
        4) 10 BASE-F, 10 Mbit/s Ethernet over fiber optic (IEEE802.3j)
        5) Related Protocols:

            a) TCP/IP (IETF STD 1)
            b) CobraNet
            c) DANTE

4. Communications Network Infrastructure Requirements:

    a. Refer to specification sections 270500 and 271100

1.3 REFERENCE STANDARDS

A. Refer to Specification Section 270500 for additional information.

1.4 SUBMITTALS

A. In addition to all "Submittal" requirements specified in Division 01, Specification Section 270500 and all requirements by related specification sections, the Contractor shall also conform to all requirements of this section.

1. Provide a detail operational narrative of all paging and control functions of the PA system.
2. Provide a listing of user log-in options and associated user matrices.

3. Provide a preliminary list of all on-screen operator functions, emergency response instructions and help menus.
4. Alternatives to the basis of design may be submitted for Owner Representative’s approval.
5. Failure to provide all required documentation in accordance with ALL related specification requirements at the time of shop drawing submission shall result in all submittals returned for non-compliance to the contract requirements.

1.5 QUALITY ASSURANCE

A. In addition to all “Quality Assurance” requirements specified in Division 01, Specification Section 270500 and all requirements by related specification sections, the Contractor shall also conform to all requirements of this section.

B. Contractor’s Qualifications:

1. Firms regularly engaged in the installation of Audio Paging and Announcement systems of a similar scale and complexity and that have three (3) years of installation and programming experience with systems similar to that required for this project. The Contractor shall have been actively engaged in installing, maintaining, and operating similar systems and services as outlined in this document.
2. Provide references to include client names, phone numbers, and a summary of project details. These references will be checked, and the clients will be asked questions relative to the performance of your company.
3. Provide verification that installation personnel responsible have been properly trained to install the products described in this Section.
4. Provide full time project manager with a minimum of ten (5) years' experience in the installation and programming of audio paging systems and related infrastructure. Project manager shall be assigned for the duration of the project and shall not be replaced without written consent from the Owner.

C. Manufacturer’s Qualifications:

1. Firms regularly engaged in development of products of the types and capacities required for this project; whose products have been in satisfactory use in similar service for not less than three (3) years.

D. All work shall be performed in accordance with the applicable manufacturer’s installation instructions, and requirements. In addition, all work, testing and commissioning shall be in conformance with all requirements of the Contract Documents, applicable Codes and Standards, as well as all requirements of the following authorities having jurisdiction:

1. Destin-Fort Walton Beach Airport (VPS)
2. VPS- IT Standards if applicable
3. Fort Walton, Florida
4. Okaloosa County

E. Coordinate all operational provisions of the PA system, programming and operational features and functions.

1. Prior to finalization of any programming the Contractor shall review, with VPS and Owner's Representative, the following:

    a. System integration methodologies
    b. All audio paging functions
    c. All system configuration, monitoring, and troubleshooting functions
    d. Utility screens, user interface screens, on-screen operator functions

2. Failure to provide this review, prior to final programming, shall result in the Contractor making all changes requested by VPS and the Owner's Representative at no additional cost to the project.

1.6 RECORD DOCUMENTS

A. Provide the Owner with a complete set of record drawings, in accordance with all requirements of Division 01 and Specification Section 270500.

1.7 INTELLECTUAL PROPERTY

B. Refer to Specification Section 270500.

1.8 SOFTWARE AGREEMENT

A. In addition to the requirements found in Division 01 and Specification Section 270500, the Contractor shall also conform to the requirements of this section.

B. Included as part of the scope of work for this project, the Owner shall retain ALL ownership and access rights to all PA system programming.

1. The contractor shall provide to the Owner's Representative complete copies of all PA system software, system programming, and all software licenses related to the PA system, prior to final acceptance. Programming shall include, but not be limited to, all device identifications, device descriptions, logic matrices, all program access level passwords, as well as all function and sub-function routines.

1.9 EXTRA MATERIAL

A. In addition to all "Extra Material" requirements as specified by Division 01, Specification Section 270500 and all requirements by related specification sections, the Contractor shall also conform to all requirements of this section.

B. Provide Owner:

1. Digital Microphones – Two (2) of each type installed under this project.
2. Amplifier Module (T6472L) – Two (2)
3. Speakers – Two (2) of each type installed under this project.
4. Any other devices required for this system to function properly – Tw (2) of each type installed under this project.

PART 2 – PRODUCTS

2.1 GENERAL

A. Provide all necessary PA system components, servers, and software and software upgrades in conformance with the performance requirements of these and all related Specifications. The PA system shall be provided in accordance with manufacturers' recommendations in order to meet all system performance criteria, configured to provide a user-friendly operating platform in a seamless manner.

B. Acceptable products:

1. MediaMatrix – Peavey, no approved equal.

2.2 SYSTEM PERFORMANCE

A. Technology – This system shall utilize the latest in digital audio, video and networking technology. The entire system shall be digital and not utilize combinations of analog and digital circuits. At the first point of connection to the system, microphones and other program sources shall be digitized and remain in the digital domain until the final power amplifiers. Systems that use multiple stages of analog/digital quantization are not acceptable.

2. The system shall be entirely software driven. No analog controls may exist anywhere in the system that could allow unauthorized adjustments or users.
3. Microprocessors shall manage and control all system functions and hardware including microphone communication stations, announcement queuing, telephone interfaces, distribution of emergency announcements, local announcements, terminal announcements, background music distribution, announcement recording, and messaging.

B. System Architecture – The system shall feature distributed processing, with one or more virtual Announcement Control System (vACS) software controllers. The vACS controller shall provide a network-centric architecture to minimize central head-end equipment. This will eliminate the possibility of complete system failure should catastrophic failure happen in any one room or area. This distributed topology will also allow for local interface terminations with other systems, rather than the need to route connections to a centralized head-end location. As an alternate, the vACS, and optional Enterprise and MS SQL may be installed in virtualized environment for high availability architecture. Failed or abnormal performance of any active system component shall generate a fault to the fault reporting system.

C. Ethernet Network – The entire system shall operate on a single Ethernet network. The network shall be designed using a hierarchical star configuration with a Gigabit backbone between all core, intermediate, and edge switches. In shared network environments, the Paging System shall be isolated from other broadcast traffic on a separate VLAN. Multiple VLAN's may be required depending on the ultimate system size and the manufacturer's recommendations. The network shall be designed and installed using recognized industry practice and tested in accordance with ANSI/TIA/EIA 568B-1, 2, and 3.

D. Software – All system software for every system component shall be integrated into a single enterprise-class application utilizing a common database.

1. The entire system shall be programmed, controlled, and monitored by use of a single software application provided by the manufacturer of the system. Systems that require opening different applications provided by differing manufacturers to setup, control, or monitor system operations are not acceptable.
2. Set up of announcement control, messaging, signal processing, and amplifier control functions shall utilize graphically oriented objects and a common tree-view for the entire system. When expanded completely, the left portion of the window shall show a tree view of the vACS nodes controlling each area of the facility (i.e. individual concourses, terminals, gates, etc. or as applicable). Each expanded view shall include the functional setup parameters for each vACS, microphone communications station, integrated digital power amplifier system, and visual display device. These include but are not limited to microphone communications station setup, zone & zone group setup, user and user group setup, permanent digital record and playback (PDRP) configuration, audio monitor and testing setup, zone equalization, ambient analysis setup and power amplifier control.

E. Password Security – System access to setup workstations, servers, and remote access shall require an authenticated username and password. Access to microphone communications stations may require an optional user ID and PIN. Each user ID and PIN shall allow for up to 8 characters. The password server shall allow assignment of users to employer user groups for restricted access to appropriate functions and areas.

F. Announcement Distribution – The system shall provide for distribution of announcements and messages to each zone of the system. A zone is defined as the smallest addressable area of speaker coverage. The system shall prevent a single zone from receiving more than one announcement or message at a time. No announcement or message shall be lost or discarded due to coordination or priority preemption unless configured as such through the business rules programming. For initial programming configure the systems as follows:
1. Program material sent to zones (i.e. Background Music) shall be ducked during any announcement or message.
2. A local or multi-local zone group announcement shall not delay a terminal announcement from playing, but it shall interrupt and override the terminal announcement in the zones that have been assigned to its use.
3. Multiple emergency announcements may be made at one time if no zone conflicts for that class of announcement exist. Regardless of zone announcements, emergency announcements immediately suspend all other zone activity in the effected zones until completed or cancelled.

G. Priority Levels – Announcements and messages shall be processed and distributed based on defined levels of priority. A minimum of (256) priority levels shall be available. Initial priority levels shall be assigned as follows:

1. Not Assigned
2. Emergency Live Announcements
3. Emergency Messages
4. Not Assigned
5. Local Announcements and Messages
6. Not Assigned
7. Terminal Announcements and Messages
8. Not Assigned
9. Not Assigned
10. Program Material (Background Music)

H. Signal Routing – The system shall provide for simultaneous routing of the following traffic.
1. Each Announcement Control System (vACS) Instance or LAN segment shall route up to 240 paging stations and 32 message channels to up to 512 zone outputs. Routing is limited only by the number of CobraNet channels that are dynamically assigned. No announcements shall be routed through the servers or announcement controllers unless being stored for delayed playback.
2. The system shall distribute (8) program (BGM) channels assignable to any zone output.
3. The system shall distribute and monitor audio from any monitor point to the requested monitoring speaker station.
4. All routing of signals shall be on the digital audio network.
5. All switching shall be quiet with no audible switching transients, clicks or pops.
6. The system shall route unlimited visual announcements to the display devices.

I. Announcement Properties – Each Announcement shall be configurable with announcement properties. These include:

1. Announcement Gain
2. Priority Level
3. Time to wait in a ready state.
4. Time to Warn for cutoff.
5. Maximum Length
6. Maximum Wait in busy queue
7. Activate with only partial resources.
8. Preempt All
9. Continue with some zones Preempted
10. Preemption Zone Kill
11. Recover Zones as available
12. Ducking
13. Zone Mute
14. Emergency

J. Multi-Local Zone Groups – The system shall have the ability to program multi-local zone groups for each microphone communications station. These zone groups shall be pre-established groups of relational zones that are commonly accessed from those stations. A single number entry (common to every station for that relationship) shall be used to access those zone groups.

K. User Groups - The system shall provide for editable user group assignments that control user access. User groups are sets of zone assignments within the facility. Zone groups may be selected by user groups based on approved access. User groups shall be available to users at microphone communication stations based on their authenticated membership in a user group and password/PIN.

L. Logging – When a dedicated or virtual system server is included in the system topology, and the server has been loaded with Enterprise software, the Logging System portion of the software shall provide complete logging/archival for the following (4) types of system activity:

1. User Activity Log – This feature shall record all log in and out activity by time and date and record event descriptions for each. This includes all changes made to the system setup configuration.
2. ACS Announcement Log – This feature shall record all events in the system including all announcements and messages that play. It shall include the user logged in, announcement type, time and date, originating station, destination zone(s) and length.
3. Communications Station Security Log – This feature logs the status of communications stations. It shall include the user, users' company (airline), station name and status
4. Fault Logger – This feature shall log all system faults. It shall include type and location fault, time and date of fault, time and date of restoration, and applicable test data. Faults shall be assignable to fault classifications and configurable for prioritized delivery.
5. Should the system configuration require only a single vACS controller, and no dedicated or virtual system server, log entries and archives will be held in volatile RAM, with all entries being lost upon loss of system power. Periodic external archiving of system logs should be performed if permanent log storage is required.

M. System Capacity – Each system shall provide for up to (32) vACS nodes. Each vACS node shall provide support for up to (240) microphone communications stations, (480) expansion microphone stations and over (500) zones. Any microphone communication station may be assigned to any combination of zones in the system.

N. Audio Specifications

1) Frequency Response	± 0.5 dB 20Hz to 20kHz
2) Total Harmonic Distortion (THD)	< .05% @ Rated Amplifier Output 20Hz to 20kHz
3) Noise Referenced to Input	-120 dBu 20Hz to 20kHz
4) Signal-to-Noise	>90dB
5) Maximum Latency – From Communications Station to Power Amps through (3) Network Switches	11.9 ms

O. Messaging Servers – The messaging system (Digital Record and Playback (DRP) shall be integral to the function of the vACS and be integral to a vACS controller or reside on the network as a message server appliance.

1) (8) Channels of Recording and (8) Channels of Playback shall be simultaneously available in each message server. Each vACS LAN or VLAN segment can support up

to four message servers. Each channel shall provide a minimum of 130 seconds of recording. Times shall be configurable based on announcement type.

2) When a communications station or workstation initiates an announcement, the system shall dynamically assign a communications channel (CobraNet), and assign it to an open DRP channel. The announcement shall be played if the mic switch is released prior to the end of the record time. If the mic switch is pressed and held during a 5 second (or as programmed) silence period, the announcement shall be cancelled. The announcement will playback automatically, to the selected zone group, in its assigned queue position.

3) Messages shall be stored in non-volatile memory and have a minimum capacity of 20,000 minutes.

4) The system shall support minimum of (8) languages.

5) The system shall support minimum of (3) types of messages. Each message shall have an audio and visual element to provide visual paging that duplicates the audio in the designated zones. The audio and visual elements shall start together and maintain continuous synchronization through the duration of the message.

6) Some messaging may require the use of a dedicated or virtual system database server, and Enterprise software. Contractor shall confirm the necessary hardware required for each type of message to be utilized.

   (a) Standard Messages – These are standard single file (take) messages of following categories. Standard messages may be assigned to any zone or zone group and may be initiated by any assigned communications station or scheduled for play by the system clock.

      1. Emergency announcements and instructions.

      2. Public service announcements (no parking, no smoking, etc.)

      3. Regulatory (do not leave bags unattended, etc.)

      4. Other institutional messages.

   (b) Assembled Messages - Assembled messages shall allow audio message "takes" or phrases to be "assembled" in real time to create a complete message. Assembled messages shall allow dynamic information provided by the user or a database to be included within the message to provide for specific information or instructions. The user shall have the ability to "build announcements" using stored takes utilizing the built-in editing system. Takes shall be professionally recorded human voices and edited to allow assembly in any random order. Each message shall be up to 30 takes long. The following messages shall be assembled:

      1. Flight boarding sequence announcements.

      2. Flight arrival, bag claim, and delay announcements.

      3. Gate changes or other gate operations.

      4. Delayed flight or canceled announcements.

      5. Provide message libraries for English, (add others if applicable)

P. FAS Ambient Noise Analysis and Control – The system shall include the capability to automatically adjust the volume levels in each zone based on changes in the ambient noise levels in those zones.

1) Each zone that includes a sensor within its boundaries shall have automatic control.

2) The system shall automatically null announcement or program material for that zone to prevent "runaway" or inaccurate volume tracking and shall provide smooth unobtrusive control.

3) Software shall allow for setup of the following parameters.

(a) Automatic, slaved to an automatic channel, or fixed modes.

(b) Configuration of one to four sensors for control of a zone and control of multiple zones from one or more grouped sensors.

(c) Control of threshold, maximum gain allowed and scaling ratio.

(d) Software shall provide for real time monitoring of sensor levels, program levels, output levels and gain changes.

(e) System shall provide for automatic setup of zones using the integrated system messaging.

Q. System Equalization - The system shall provide for frequency response equalization for each speaker zone output.

1) Filter types shall allow notch, high pass, or low pass.

2) Filters shall have a Q range of 0.055 to 33.

3) Provide (9) filters for each zone output.

R. Automatic Backup Amplifier Switching – The system shall include backup amplifier switching in the event of the failure of a power amplifier.

1) The system shall automatically detect failure or abnormal operation of a power amplifier and replace it with a spare amplifier without operator initiation.

2) One spare power amplifier shall be installed for each (8) installed amplifiers.

3) The spare amplifiers shall be only be powered up when they are transferred into service. The system shall detect a failure, power up the spare amplifier, and complete the transfer for restored operation within 2 seconds of an amplifier failure.

S. Monitoring System - Provide the capability for complete integrated aural and signal level monitoring of the system at designated monitor points. This capability shall be available for selection at each system workstation for level monitoring and at each monitor speaker location for aural monitoring. Audio routing shall be automatic from any monitor point to any listening point.

1) Selection shall be instantaneous and not introduce pops or other audio noise.

2) Provide monitor points for each direct digital input, local analog input, ambient channel output, equalizer output, amplifier input, amplifier output, and speaker zone (plus end-of-line).

3) Provide capability to select an announcement or message in progress from the main activity screen and select monitor points for that activity during the announcement or message.

4) Provide a dynamic multi-channel VU monitoring screen selectable for each T9160 Mainframe. The screen shall include calibrated VU meter bars, channel status, signal presence, and fault status for each of the (16) channels. The screen shall also indicate status of the backup amplifier channels.

T. Testing System – The system shall provide for self-diagnostics that operate in real time under software control.

1) This self-testing shall include testing of any combination of communications stations, direct digital input, local analog input, ambient channel output, equalizer output, amplifier input, amplifier output, and speaker zone (plus end-of-line).

2) The system shall be capable of testing to a resolution of 0.5 dB.

3) Manual or programmed audible frequency self-testing shall be available as well as an inaudible (20 kHz) test designed to exceed the requirements of NFPA 72.

4) All testing must be capable of operating simultaneously with normal system operations including test setup. Systems that disrupt or play audible test tones to more than a single zone at a time are not acceptable.

5) Each speaker line shall include end of line monitoring to confirm continuity in accordance with NFPA72. Any fault in a speaker line shall be reported within 2 minutes.

6) Each speaker line shall be tested for Ground Fault Interruption (GFI) on both sides of the balanced speaker cabling. This testing shall be available without applying power to the amplifier to verify cabling integrity prior to powering.

7) All test results shall be reported to the fault reporting system.

2.3 ANNOUNCEMENT CONTROL SYSTEM (VACS)

A. The system shall consist of one or more Virtual Announcement Control System controllers. Each vACS shall be designed and distributed to allow continued announcement and standard message operation in the event of failure of the system server, or communication to other vACS nodes.

1) Announcement Controller – The Announcement Controller shall manage all primary operations of the ACS including paging communication stations, audio routing, message management and Ethernet communications. It shall include an on-board solid-state hard drive as well as flash memory for fail safe emergency message playback. The Controller shall accept standard VoIP protocols via two (2) native, simultaneous connections, and shall accommodate eight (8) additional inputs when separate third-party media converters are included. The physical and software controller shall be as recommended by the manufacturer.

2) Power Supplies – The server/controller shall be powered with individual 12-volt power supplies. Each power supply module shall be capable of providing 4 amps of power to each Device.

3) For each IED 1150 server, provide a backup IED 1150 Lifeline Backup Server, configured to seamlessly take over primary server functionality in the event of a primary server failure.

B. System Software (Server/Controller) – Each vACS Announcement Controller will be loaded with system software that will enable it to manage up to 240 digital microphone paging stations, and over 500 zone outputs.

1) System Software will include capability to interface/control other digital system components such as power amplifiers and logic devices.

2) Software shall be licensed with an annual license fee which includes support and updates.

3) Latest software shall be by MediaMatrix, no approved equal.

C. Ambient Analysis Sensor Collector – The ambient analysis sensor collector shall accept inputs from the ambient analysis sensors, process their data, and transmit the data to the appropriate amplifier system.

1) Connection to the system shall be via a 100BaseT Ethernet port.

2) The collector shall be rack mounted in 1RU and accept inputs from up to 32 ambient noise sensors.

3) The collector shall be powered through the PoE Ethernet Port.

4) The Ambient Analysis Sensor Collector shall be by Bogen or as recommended by the PA system manufacturer.

D. Ambient Analysis Sensor – The Ambient Analysis Sensors shall detect ambient noise levels in respective speaker zones. Noise levels shall be processed using an A-weighted curve and converted to a DC waveform for transmission to the Ambient Analysis Sensor Collector.

1) The Ambient Analysis Sensor shall be Bogen model ANS501 or as recommended by the PA system manufacturer.

E. Integrated Digital Power Amplifier System (IDPAS) – The Integrated Power Amplifier System shall provide DSP processing and power amplification for up to (4) zones in a single modular mainframe.

1) Digital Audio Network Interface – The network interface shall receive (32) dynamic assigned audio channels from the vACS via the Ethernet Network. Control for the IDPAS and monitoring shall be included on the network. The NIC shall provide dual outputs to support a redundant network.

2) Zone Manager – The IDPAS shall provide zone management for (4) channels as directed by the vACS. Channel management shall be structured to utilize the minimum channels necessary on the network to support paging, messaging and background music activity for any combination of zones.

3) DSP Processing – The IDPAS shall include digital signal processing for (4) channels of audio. Each channel shall include (9) bands of parametric equalization, time delay, ambient analysis control, (7) monitoring points, and (7) testing points. Complete setup and control software shall be integrated within the Enterprise Software and available

on the network for configuring, controlling, monitoring, and testing the DSP for each channel.

4) Ambient Analysis and Control – The Ambient Analysis System shall adjust signal levels in response to either ambient noise levels or computer commands. The system shall operate in real time and shall not be a "sample and hold" system. The system shall include an automatic calibration sequence. All setup, configuration and monitoring controls shall be software based with the ability for multiple sensors averaged to control a single channel(s) or for a single sensor to control multiple channels. The sensors shall utilize control signaling and levels that allow co-locating with the speaker cable for cable routing efficiency. Three modes of operation shall be possible:

   (a) Automatic – Changes attenuation levels in response to noise levels reported by remote sensors.

   (b) Slaved – Changes attenuation levels based on remote sensors of an automatic channel.

   (c) Fixed – Fixed attenuation as set by the computer and user.

5) Internal Monitoring – Each IDPAS shall include in internal audio monitoring buss with software selected switching. This monitor shall allow selection of a monitor point from the control software to allow visual and audio monitoring of the channel network input, channel direct input, ambient channel output, EQ output, amplifier input, amplifier output, and speaker load monitor for each of the (4) channels. This feature shall operate simultaneously and independent of the automatic testing.

6) Automatic Testing – The automatic testing system shall locally test and process audio test signals through the IDPAS. These tests may be done manually on demand for any single test point as well as globally in the mainframe on a completely automated basis during the day. The test points duplicate those of the monitoring points above with a testing resolution of 0.5 dB.

7) The Integrated Amplifier Mainframe shall be the Peavey Ci 30x4 amplifier, no approved equal.

F. Limited Function Digital Microphone Stations – Limited function microphone stations shall have (4) selection buttons. The station shall be a network appliance with control and CobraNet audio communicating on the audio network. Connection to the system shall be 100BaseT with power provided by a PoE switch port. Microphones shall be handheld and utilize a magnetic mount. Microphones shall include a line amplifier in the microphone shell to eliminate microphone signal levels beyond the microphones. Stations shall be provided in surface wall-mounted (2-gang) or desktop versions as noted on the drawings and based on the mounting situation required.

1) Wall-Mounted Microphone Station – Peavey RMP-2 (with handheld microphone); no approved equal.

2) Desktop Microphone Station – Peavey Pagematrix 4 (with desktop base and handheld microphone); no approved equal.

G. Microphone Communication Station Enclosures - For station mounting locations requiring desktop, angled vertical, or angled horizontal, provide factory enclosures to match the finish of the station. Enclosures shall be non-metallic and include rubber feet.

2.4 UNINTERRUPTABLE POWER SUPPLY (UPS)

A. Provide dedicated UPS units in conformance with the performance requirements of all PA system equipment in each communications or audio equipment room rack. The UPS shall be provided in accordance with all manufacturer recommendations in order to meet all system performance requirements. Additionally, the UPS shall meet the following minimum requirements:

1. 19" rack-mounted unit providing a minimum of 2150VA / 1650W power with sufficient internal and/or external battery packs to provide 7 minutes of runtime at full load and 15 minutes of runtime at half load.
2. Line interactive with Automatic Voltage Regulation (AVR).
3. Minimum (8) NEMA 5-20R receptacles.
4. UL listed for use on audio/visual equipment and capable of providing protection against of blackouts, voltage fluctuations, and transient surges.
5. Support for remote monitoring and configuration of UPS via integrated network connection.
6. Equipped with built-in audible alarm and front panel LED/LCD display to indicate status of line power, battery power, battery low/replace, voltage regulation and load level.
7. Power Input:

    a. 80VAC – 145VAC
    b. 60 Hz +/- 3Hz (Auto-Sensing0
    c. Resettable Thermal Fuse

8. Power Output;

    a. 120VAC / 2150VA / 1650W Minimum
    b. Pure Sine Wave
    c. 57 – 63Hz (60Hz nominal)
    d. 4ms Transfer Time, Line to Battery / Battery to Line (typ.)
    e. Overload Prottection

9. Total Harmonic Distortion (THD), Battery Backup: 1.5% @ 60% Load / 5.2% @ 100% Load
10. Surge Protection: Line-Neutral 381 joules @ 270V Clamp Voltage
11. UPS shall be Middle Atlantic 2200R-8IP or approved equal.
12. Provide external battery expansion, Middle Atlantic MAP-EBPR or approved equal.

2.5 NETWORK SWITCHES

A. Network switches shall be commercial-grade units with lifetime warranties. The switches shall be equipped with GBIC/SFP modules and ports as required to provide a Gigabit Backbone and 100BaseT ports for each device. All switches shall be managed and be full non-blocking. The switches shall include QoS, Spanning Tree, have a minimum of 32mb of memory and be capable of PoE/PoE+. Switches providing 100BaseT ports for Collectors and Communications Stations shall include PoE/PoE+ ports as required, or provide rack mounted Mid Span Power devices.

B. Edge Switches shall be Cisco 3850 Catalyst Series or latest model with Gigabit and Port Modules as required, no approved equal.

1. Provide all programming of all network switches. Coordinate with VPS-IT for specific programming requirements and IP address schema.

PART 3 – EXECUTION

3.1 EQUIPMENT PROTECTION

A. Comply with all requirements of specification section 270500.

1. Examine all physical and environmental conditions, equipment and device locations, auxiliary system connectivity requirements impacting the installation of all network systems and report any unsatisfactory conditions in writing to the Owner's Representative.

3.2 WORK PERFORMANCE

A. In addition to all requirements as specified by Specification Section 270500 the network communications systems shall also be provided in accordance with the following requirements:

1. Prior to the final commissioning and\or programming of any network communications components, the Contractor shall provide a review with the Owner's Representative addressing all network integrations, programming and related operational connectivity.

a. Failure to provide this review and get final sign-off prior to programming shall result in any costs related to changes requested by the Owner's Representative as not being charged to the project.

3.3 EQUIPMENT/CABLE INSTALLATION AND REQUIREMENTS

A. In addition to all requirements as specified by Specification Section 270500 the network communications systems shall also be provided in accordance with the following requirements:

1. All system cabling shall be of the type, size, and specification as required by all contract documents as well as stipulated by all codes and standards as specified by specification section 270500.
2. All network communications cabling shall utilize Category-6 UTP cables and installed in accordance with the requirements of specification section 270500. All network cabling conduits shall not contain any AC carrying conductors or non-associated network communications cables within the cable raceways\conduits or cable bundles.

a. In addition, all structured cabling associated with the installation of any network communications system shall comply with all requirements of EIA\TIA standards for the proper installation, termination and testing of all

fiber optic and Category-6 UTP cabling.

b. Contractor shall provide all equipment, components, devices, hardware, equipment racks\cabinets, patch panels, and all appurtenances necessary to provide fully operational network communications systems utilizing a UTP cabling topography. Coordinate all structured cabling with all trades and contractors prior to shop drawing submission.

3. All serial communications cabling shall utilize 16 AWG, 4 pair shielded twisted (STP) cables and installed in accordance with the requirements of specification section 270500. All serial cabling conduits shall not contain any AC carrying conductors or non-associated network communications cables within the cable raceways\conduits or cable bundles.

3.4 TRANSIENT VOLTAGE SUPPRESSION

A. Comply with all requirements of specification section 270500.

3.5 GROUNDING AND BONDING

A. Comply with all requirements of specification section 270500.

3.6 EQUIPMENT IDENTIFICATION

A. Comply with all requirements of specification section 270500.

3.7 MAINTENANCE & SERVICE

A. Comply with all requirements of Division 01 and specification section 270500.

3.8 WARRANTY

A. In addition to all "Warranty" requirements as specified by Division 01, Specification Section 270500 and all requirements by related specification sections the Contractor shall also conform to all requirements of this section.

1. Provide a 5-year extended manufacturers' warranty on each HMI central processor units provided as part of this project.
2. Provide a 5-year extended manufacturers' warranty on each Touch Screen monitor provided as part of this project.
3. Provide a 2-year extended manufacturers' warranty on each HMI UPS unit.

B. Provide all manufacturers extended cable warranties based on matching wire to component compatibility requirements. All cable warranties shall be in effect for a period of not less than 20 years.

1. The warranty must include the following statements regarding the cabling system:

a. "That all communications networks have been certified and will support and conform to ANSI/TIA-568-C specifications covering any current or future application which supports transmission over a properly constructed and horizontal cabling system premises network which meets the channel and/or

basic link performance as described in ANSI/TIA-568-C."

b. "That all communications networks are free from defects in material or faulty workmanship."

3.9 FIELD SERVICES

A. Comply with all requirements of Specification Section 270500.

3.10 TRAINING

A. Comply with all requirements of Division 01 and specification section 270500.

B. Documentation:

1. Contractor shall provide documentation to include all test results and as-built drawings, test results shall be computer generated and shall include all trace reports indicating each pair tested in accordance with all requirements of specification section 270500.

a. One Hard Copy shall also be provided to the Owner's Representative. Software for viewing the test results shall also be provided in the soft copy package.

C. Final Acceptance

1. Acceptance of all network communications systems, by the Owner's Representative, shall be based on the results of testing, functionality, and the receipt of documentation. The testing, of all UTP cabling, fiber segments and all serial data cables must meet the criteria established in the specification sections 270500.
2. The Contractor must demonstrate to the Owner's Representative that 1000 Mbps data signals can be successfully transmitted, bi-directionally, from the layer II switch to and from a minimum of 10% of individual data drops on each floor, witness tested by the Owner's Representative. The number of data drop locations to be tested shall be determined by Owner's Representative. With regard to documentation, all required documentation shall be submitted to Owner's Representative.

D. As-Built Documentation:

1. Contractor shall provide clean copies of the technology drawings depicting all as-built conditions for all data drop locations, cable routing and identification, patch panel, data switch port terminations, component layouts and all information as required by Division 01 specification section.

END OF SECTION 271500

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PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, and all related Specification Sections, shall all apply to this Section.

B. Related Specification Sections:

1. Refer to specification Section 27 05 00 for additional information.

C. Reference Symbols:

1. Refer to specification Section 27 05 00 for additional information.

D. Abbreviations:

1. Refer to specification Section 27 05 00 for additional information.

E. Definitions:

1. Refer to specification Section 27 05 00 for additional information.

1.2 SUMMARY

A. In addition to all requirements stipulated in Specification 27 05 00 this section contains the overall requirements and design intent associated with all Division 27 requirements as it relates to the installation of all data network communications equipment as required to provide fully functional and operational Local Area Network (LAN) including but not limited to all active components and interfaces in support of the following system applications:

1. Data Communications Premise Distribution System
2. VoIP Telephone System
3. Airline data and telecommunications demarcations
4. Wireless Local Area Network (WLAN)
5. Dynamic Wayfinding and Signage Displays
6. IPTV Distribution System
7. Multiuser Flight Information Display System (MUFIDS)
8. Public Announcement Systems (PA)
9. Access Control System (ACS)
10. Video Surveillance System
11. Digital Addressable Fire Alarm System

B. This section also addresses all requirements for submittals, quality assurance, product handling, record documents, project conditions, installation, system performance, demonstrations, testing, and certifications related to the installation of all data communications equipment for this project. Refer to specification Section 27 05 00 and all related specification sections for additional project requirements.

1. All symbols are shown on the contract drawings as close as possible to their intended location. Contractor shall coordinate the installation of all, devices, controls, components, and integration of systems as herein specified related to the all data network communications equipment in support of provide fully functional and operational Local Area Network (LAN). The contractor shall document all coordination requirements with all affected trades and sub-contractors at the time of shop drawing submission.
2. Drawings for this work are diagrammatic and intended to convey the extent, general arrangement, and locations of the work. Because of the scale of the drawings, certain basic items such as access panels, conduits, cabinet sizes, penetration sleeves, pull boxes, back-boxes and junction boxes may or may not be shown on the contract drawings.

a. Include all materials, equipment, components, devices and appurtenances where required by code all related specification sections as required for the proper installation of all data network communications equipment as required to deliver in first class operational condition a fully functional LAN whether specifically indicated or not.

C. Use of Premises

1. Refer to specification Section 27 05 00 for additional information.

D. Coordination

1. Refer to specification Section 27 05 00 for additional information.

1.3 SCOPE OF WORK

A. Refer to related Division 27 Specification Sections and contract drawings, Division 28 Specifications Sections as well as all contract drawings and Division 26 specifications sections as required to deliver all project scopes of work related to the installation of all data network communications equipment.

1. At the minimum, the scopes of work covered as herein specified shall include but are not limited to all necessary labor, equipment, material, cabling, conduits, commissioning, and testing as well as all appurtenances as required for the proper installation necessary to deliver fully functional horizontal cabling infrastructures in support of all related Division 26, Division 27 and Division 28 systems.
2. It shall be the Contractor's responsibility for full compliance with all requirements of 27 05 00 as well as all related specification sections as required for the proper installation of all data and wireless network communications equipment as required

to deliver fully operational systems in accordance with the requirements of all Contract Documents.

a. It is the design intent for the design, furnish and install all data network communications equipment as necessary to provide the required connectivity of the Structured Cabling System (SCS) in support of all data ports, VoIP telephones, video displays, wireless access points, paging microphones, kiosks, cameras, as well as all ancillary and/or integrated systems.

1) Standard products: Equipment and materials shall be standard products of a manufacturer regularly engaged in the manufacture of telecommunications cabling products and shall be the manufacturer's latest standard design in satisfactory use for at least one year prior to bid opening.

a) Items of the same classification shall be identical. This requirement includes equipment, modules, assemblies, parts, and components.

b. The Contractor shall furnish and install all data and wireless network communications equipment as well as all horizontal and backbone cabling, conduits/pathways, cable terminations, field devices, communication room fittings, equipment, grounding, connections to electrical power, testing and labeling, appurtenances and system integrations necessary to deliver all scopes of work as herein specified, all related specification sections and in accordance with the Contract Drawings.

3. Perform all work, coordination, systems integration, engineering design, and testing, and shall provide all products required in order to ensure fully operative systems and proper installation of all equipment. System operability and proper installation shall be verified via completion of the acceptance test plan.

a. The Contractor shall install all system components, equipment, and appurtenances in accordance with the manufacturer's instructions, and adjustments required for a complete and operable system.
b. All grounding shall be installed in accordance with all requirements of Specification Section 270526 as necessary to preclude ground loops, noise, and surges from adversely affecting system operation.

B. General LAN Requirements

1. The LAN configuration shall utilize a combination of active and passive network equipment, comprising of core Router and network switches. The configuration shall star out to individual edge level devices located throughout the premises in designated areas. Multimode and Single Mode Fiber Optic Cable shall be the primary mode of connectivity, with CAT 6 cabling used as required. Refer to Specification Section 27 10 00 for backbone and riser cabling requirements.

1) The data network communications system shall perform as designed providing a minimum of 10/100/1000 Mbps to each end user device and 10Gbps from edge switch to core switch on the backbone.

2. All LAN equipment shall provide Internet Protocol (IP) switching across all types of network technologies and topologies, including Ethernet, Fast Ethernet and Gigabit Ethernet.

   a. The LAN architecture shall be based on 10 Gbps between the core networking switch located in the MDF and the edge level networking equipment located in the IDFs. In addition, the edge level equipment shall be dual homed to the separate core devices where applicable.

      1) Network equipment shall support full-duplex connectivity on links (10Base-TX, 100Base-TX, 1000Base-TX, 100Base-F/TX, and 1000Base-FX).
      2) All fiber interfaces on network switches must support Digital Optical Monitoring (DOM) feature.

   b. Each active device shall be accessible from a network, console or auxiliary RS-232 port. A configuration specialist shall be able to enter supervisory mode and change default configurations as appropriate for required operation of special system components.
   c. Each active device shall be capable of generating Simple Network Management Protocol (SNMP) or SNMP3 alarms. The device shall be respondent to RMON inquiries from an expert level network management inquirer.
   d. All network equipment shall be compliant to physical and operational parameters. The equipment shall be capable of responding to SNMP, SNMP3 and/or RMON network management program calls from the Network Management System.
   e. Network equipment shall provide multimedia and multicast support through use of Protocol Independent Multicast (PIM), Internet Group Management Protocol (IGMP).
   f. All network equipment shall be Virtual Local Area Network (VLAN) compatible based on both port and MAC addresses. VLAN assignments shall be configurable from a centralized administrative console.

      1) Network equipment shall support automated VLAN creation and administration capabilities.

         a) Network equipment shall not require re-configuration of end-station network interface cards or network interface card drivers to accommodate intra-VLAN and inter-VLAN traffic.

3. Network equipment shall support port mirroring. This shall be done by sending frames directly from a specified port to another switch port or from an external network analyzer.

a. Network equipment for use in the main MDF and TRs shall belong to one family of product. The equipment must allow for common sparing of all Interface Processor Modules and all Supervisor Modules.

4. All active LAN devices shall include all software as required for interconnectivity. All active devices shall have fully functional network management options installed.

1.4 REFERENCES

A. Refer to 27 05 00 for additional information.

1.5 SYSTEM DESCRIPTION

A. Refer to Specification Section 27 05 00 for additional information.

1.6 SUBMITTALS

A. In addition to the submittal requirements as stipulated by Division 01, Specification Section 27 05 00 as well as all related specifications sections, the Contractor shall also conform with the following submittal requirements:

1. Submit technical and operations manuals.

   a. Manuals shall describe function, operation, and programmable parameters for each card and port for each device to be installed.
   b. Manuals shall include required maintenance to be performed.
   c. Manuals shall describe function, operation, and programmable parameters for each card and port for each device to be installed.
   d. Manuals shall include required maintenance to be performed.
   e. Manuals shall be suitable for the training of future personnel by the County, and for use as a reference for current County personnel in performing work assignments.

2. For each active device installed, provide a printed configuration including a printout of the device as displayed on the network management system. Printed configuration parameters for each port on the device shall accompany the written report.

   a. Provide all calculations and/or analysis to support design and engineering decisions as specified in Submittals

3. An implementation schedule listing dates for LAN equipment installations for approval by the County. The dates of LAN equipment installations shall be in accordance with dates for installation of the various special systems and users.

a. It is incumbent upon the LAN implementers to include the dates for special system and user installs into the schedule.

4. Provide Cable Plant interconnectivity chart showing all fiber patch panels and individual identifiers for each fiber associated with the interconnectivity of each network device.
5. Include spare parts list for approval by Owner.

1.7 QUALITY ASSURANCE

A. In addition to the requirements as stipulated by Specification Section 27 05 00 as well as all related specifications sections, the following shall also apply:

B. The Contractor shall furnish, erect, install, connect, clean, adjust, test and condition all data communications equipment, materials, components and all required appurtenances. The Contractor shall be responsible to program and place in service all network communications equipment to meet the performance requirements in accordance with all related specification sections, manufacturer's directions and recommendations unless otherwise indicated by the Contract Documents.

1. Submit certified documentation that the following experience requirements are in conformance.

a. Contractor Qualifications

1) The contractor shall be certified by the manufacturer of the products, adhere to the engineering, installation and testing procedures and utilize the authorized manufacturer components and distribution channels in provisioning this Project.
2) Must be supervised on-site by a BICSI RCDD. Must demonstrate knowledge and compliance with all BICSI, TIA, UL, and NEC methods, standards and codes.
3) All members of the installation team shall be certified by the manufacturer as having completed the necessary training to complete their part of the installation. Resumes of the entire team shall be provided along with documentation of completed training courses.
4) The contractor shall provide five references for projects of equivalent scope, type and complexity of work completed within the last five years.

1.8 DELIVERY, STORAGE AND HANDLING

A. Refer to specification Section 27 05 00 for additional information.

1.9 RECORD DOCUMENTS

A. Refer to specification Section 27 05 00 for additional information.

1.10 OPERATION AND MAINTENANCE

A. Refer to specification Section 27 05 00 for additional information.

1.11 SOFTWARE AGREEMENT

A. In addition to all requirements as stipulated herein refer to Specification Section 27 05 00 for additional requirements:

1. Software License

a. Required software licenses shall be identified and supplied by the Contractor. Licenses shall be "Site Licenses" which shall cover all equipment installed now or in the future.
b. All software licenses and warranties shall be registered in the name of Destin Fort Walton Beach Airport System.

1.12 EXTRA MATERIAL

A. Not Applicable

PART 2 - PRODUCTS

2.1 MANUFACTURED PRODUCTS

A. In addition to all requirements as stipulated by Specification Section 27 05 00 as well as all related specifications sections, the following shall also apply:

1. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, that meet and/or exceed the specified performance and features of the equipment and/or systems and for which replacement parts shall be readily available to the contractor and/or Owner.

a. Equipment Manufacturers:

1) LAN Equipment: Unless otherwise specified, furnish products manufactured by Cisco Systems, Tellabs, Zhone or approved equal..
2) Uninterruptible Power Supply (UPS): Eaton or Owner Approved Substitution.
3) Workstations: Reference Specification 272200 – PC, Laptop and Server Equipment.
4) Network Printers: Reference Specification 272200 - PC, Laptop and Server Equipment.
5) For cabinets/racks and cabling infrastructure: Reference Specification 271100 – Cabinets and Equipment Rooms.
6) Courtesy Phone: CEECO or Owner Approved Substitution.

b. The equipment specified is based on the acceptable manufacturers listed. Where "or equal" is stated, equipment shall be equivalent in every way to that of the equipment specified, and subject to approval by County.

1) When more than one unit, device, or component of the same class of equipment is required, such units, devices, or components shall be the product of a single manufacturer.

2. Acceptable manufacturers for each component shall be as specified and shall be provided in full compliance with the requirements of this and all related specification sections and contract drawings.

a. Manufacturers listed as acceptable shall not negate the contractors' responsibility for providing all equipment, components, and/or appurtenance in accordance with all requirements of the Contract Documents.

1) Where manufacturer and/or manufacturer model numbers reference specific system components in the related specification sections, it is to establish the performance requirements and quality of the systems and components only.

a) It is in no way an inference that the referenced model numbers are the manufacturer's current product and are the only manufacturer's acceptable components for this project unless specifically referenced as "no substitutions."

3. Identifiers, Labels and Labeling System

a. All Identification and Labeling shall follow Specification: 27 10 00 for Identification and Labeling of Communication Infrastructure.

4. Any deviation or substitution from the specification must be approved prior to the submission of shop drawings. Refer to Specification Section 27 05 00 for all product substitution requirements.

2.2 LAN MANAGEMENT

A. All networking equipment shall interface into a network monitoring system for administering and troubleshooting the system.

1. Windows 2003 Server Standard and Enterprise Editions with 2 Intel Xeon CPU at 3.66 GHz, 4 GB RAM memory, 8 GB swap space, and 80GB disk space.

B. CiscoWorks LAN Management Solution (LMS) suite 4.0. CiscoWorks Device Fault Manager

1. CiscoWorks Campus Manager
2. CiscoWorks Resource Manager Essentials
3. CiscoWorks Internetwork Performance Monitor

4. CiscoWorks CiscoView
5. CiscoWorks Common Services

2.3 LAN HARDWARE REQUIREMENTS

A. All equipment shall be rack mountable in standard 19-inch racks. Contractor is responsible for providing fans, shelves, drawers, special power wiring, ground connections, and adapters of any kind necessary to accommodate the system installation, operation, testing, or maintenance. Contractor shall provide the appropriate factory or custom rack mount adapters for all equipment installed in the equipment rack, whether specifically itemized or not. Contractor shall cover unused slots using blank panels.

1. Fiber and Copper Patch Cords – Adequately sized fiber and copper patch cords shall be provided for each installed port in the LAN under Section 27 10 00, "Horizontal Media Infrastructure."

B. Core Networking Equipment

1. The core layer networking equipment shall be located in the MDF as shown in the contract drawings.
2. The chassis shall accommodate a minimum of nine (9) interface modules and provide connectivity to mixed network topologies. The use of a chassis is to support networking topologies without the use of external bridges or routers. The chassis shall have redundant power supplies, in the form of hot-swappable modules which can equally share the chassis power load. If one power supply fails the system shall notify the network manager and also provide a display on the front of the chassis. The chassis shall support quality of service through support of IP Precedence, Resource Reservation Protocol (RSVP), and 802.1p.
3. The switch backplane shall provide a minimum of 1440 Gbps switching fabric on the network bus.
4. The chassis shall include sufficient Gigabit Ethernet (single mode fiber) ports to support connectivity plus 10% spare ports. At the minimum, the Contractor shall provide twenty-four (24) Gigabit Ethernet (single mode fiber) ports.

   a. The chassis shall support:

      1) Redundant supervisor modules.
      2) Hot swappable line cards.
      3) Layer 2 and Layer 3 IP switching.
      4) Up to 240 10/100/1000 Ethernet ports.
      5) Support broadcast suppression.
      6) Support IGMP snooping and pruning.

   b. The core switching equipment shall be based on the Cisco Catalyst 6509 platform and shall at the minimum include in sufficient quantities to support all project connectivity the following modules:

1) Two (2) Supervisor 1440 modules with integrated fabric, Multi-layer Switching Feature Card 4 (MSFC4) and Policy Feature Card 4 (PFC4).
2) Fabric-enabled Gigabit Ethernet module(s) shall be provided with sufficient quantity of SFP ports to support all connectivity requirements for core to core and core to distribution switch uplinks.

    a) All SFP ports shall be provided with Long Wavelength / Long Haul (1000Base LX/LH) SFPs (single-mode).

3) Fabric-enabled, inline power 48-port 10/100/1000Base TX module(s) to provide connectivity for the Layer 3 switch ports.
4) Network Analysis Module.
5) Intrusion Detection Module.
6) Firewall Services Module.
7) Two (2) 6000W AC power supplies.

C. Distribution Switch Equipment (Edge Level)

1. The Contractor shall provide all edge level networking equipment and shall be located in all MDF/IDF, Telecommunications Closets and Telecommunication Enclosures unless otherwise noted on the contract drawings. At the minimum, all edge level networking equipment shall meet the following requirements;

    a. The devices shall provide a minimum of 10 Gbps switching.
    b. The device shall include a module(s) with the appropriate RJ45 Category 6 UTP 10/100/1000BaseTX ports to support all connectivity port requirements to meet the intent of Contract Drawings and all related specification sections.

        1) All edge level networking equipment shall have the capability to "stack" with additional devices to increase the available port count.
        2) All edge switches/ PON equipment shall have power over ethernet (PoE) capability.

    c. The edge level devices shall have the capability to simultaneously accommodate a minimum of two Gigabit Ethernet uplinks and 24 10/100/1000 VoIP Ethernet ports.
    d. The devices shall support the bonding and trunking of Fast Ethernet and Gigabit Ethernet ports.
    e. The edge level switching equipment shall be Cisco Catalyst WS-C3650-24PS - 640 WAC or Owner approved substitution. Refer to specification section 27 05 00 for all substitution requirements.

        1) Use 24 port switch if 16 ports or less are active. Upgrade to the 48-port switch (WS-C3650-48FD - 1025 WAC) if more than 16 ports are active.

D. UPS HARDWARE REQUIREMENTS

1. Where a communication room or closet is not connected to a building-wide uninterruptable power supply (UPS) the Contractor shall provide a rack-mounted

UPS in equipment cabinet in any Communications Room, Closet or Enclosure that houses any LAN equipment.

a. The rack mounted UPS shall have an output capacity of 5KVA per cabinet. The rack mounted UPS shall be sized to provide connected system with a runtime of 7.5 minutes at full load or 15 minutes at half load. The UPS shall be sized to provide secondary power to allow connected systems to seamlessly transition to emergency generator power in the event of primary power loss. The UPS shall be connected to a generator-backed circuit.

   1) If specified UPS cannot be installed due to space restraints a smaller UPS (Eaton 5PX1500RTN) can be substituted for Owner approved substitution. Refer to specification section 27 05 00 for all substitution requirements prior to submission of shop drawing.

      a) Any substituted UPS unit shall meet all installation, runtime requirements and environmental requirements as herein specified for any consideration of approval.

b. The UPS interface port shall have an RS-232 communications port and a 10/100 Base-T Ethernet for LAN management. Include optional environmental probe (Eaton part # 42R4317).
c. The control panel shall have a LED status display for load and battery bar-graphs in addition to replace battery and overload indicators.
d. The Output Connections shall include as a minimum one NEMA L6-30R, two NEMA L6-20R, and eighteen NEMA 5-15R.
e. Input connection shall be nominal 208 V via L6-30P plug.
f. Include software and interface card to provide Web/SNMP management through 10/100Base-T Ethernet port. Management software shall include the following attributes:

   1) Shall allow complete configuration of the UPS devices from a remote location
   2) Shall provide periodic UPS self-tests
   3) Shall provide full control over UPS transfer settings
   4) Shall provide user name and password security
   5) Shall log all power events with a description

2. The UPS unit shall be Eaton 9PX5KTF5 5000VA RM 5U 208V series with Web / SNMP Management Card for Ethernet and optional environmental probe, Owner approved substitution. Refer to specification section 27 05 00 for all substitution requirements prior to submission of shop drawing.

2.4 LAN PERFORMANCE REQUIREMENTS

A. The wired system shall perform as designed providing a minimum of 10/100/1000 Mbps to each end user device and 10Gbps from edge switch to core switch on the backbone.

2.5 IDENTIFIERS, LABELS AND LABELING SYSTEM

A. All Identification and Labeling shall follow Specification: Section 27 10 00. Any deviations from the specification must be approved prior to the submission of shop drawings in accordance with all requirements of specification section 27 05 00.

PART 3 - EXECUTION

3.1 COORDINATION

A. In addition to all requirements as stipulated by Specification Section 27 05 00 as well as all related specifications sections, the following shall also apply:

1. The contractor shall coordinate with the appropriate trade all conditions impacting the installation of the data communications and wireless network equipment, appurtenances as well as all equipment cabinet layouts including but not limited to all equipment cabinet locations, grounding connections, cable terminations, electrical power, WAP enclosures to the satisfaction of all concerned trades, subject to final review by the County.

    a. At the minimum, the Contractor shall verify the following requirements prior to the installation of any equipment.

        1) At the time of shop drawing submission, the Contractor shall demonstrate that coordination with all affected trades was performed. Failure to properly document these coordination requirements as part of the shop drawing submission shall result in all shop drawings being returned for resubmission;
        2) Coordinate the installation of any structural reinforcement or architectural modifications as required to properly install and support the installation of all wall mounted wireless enclosures.

    b. All data communications and wireless network equipment as well as all appurtenances shall comply with all installation and construction requirements of the Federal Communications Commission.

2. The Contractor shall install all system components including furnished equipment, and appurtenances in accordance with the manufacturer's instructions, and adjustments required for a complete and operable system.

    a. The County IT Representative shall perform final configuration of the network equipment. This includes, but is not limited to: VLAN configuration, IP addressing schemas, final port assignments, and trunking/bonding configurations. The installation contractor shall ensure that the proper documentation is provided to assist in the final system configuration.

3. The Contractor shall coordinate exact location of all data communications and wireless network equipment as well as all appurtenances with the County, as well

as all affected trades and Tenants prior to the installation of any components and termination of all backbone and horizontal cabling infrastructures, as well as all appurtenances.

a. If installation of any data communications and wireless network equipment or any appurtenances is performed prior to coordination with other trades, which interferes with work of other trades or operation and maintenance of the facility, make necessary changes to correct the condition at no additional cost to the Owner.

B. The Contractor shall maintain a complete set of current and up to date shop drawings and equipment submissions at the job site at all times. Shop drawings, equipment submissions and all other documents submitted for review shall be made available on site to the County upon request.

1. Coordinate any work scheduled to be provided by Owner or Owner's Vender that impact the scope of work associated with the horizontal cabling infrastructures requirements of this project. Schedule all work to ensure that the work of the Owner and all Owner Vendors can proceed in accordance with the Project Schedule.

C. In addition to all requirements as stipulated by Specification Section 27 05 00 as well as all related specifications sections, the following shall also apply:

1. Verify raceways, cable trays, boxes, are properly installed in accordance with specification sections 27 05 00 and all related specification sections.
2. Verify backboards are properly installed.
3. Verify telecommunications grounding system is properly installed and tested following Section 27 05 26.
4. Verify all structural reinforcement and/or blocking of all studded walls as required to properly install and support the installation of all wall mounted communications equipment cabinets.
5. Verify liquid-carrying pipes are not installed in or above any IDF/MDF that has active electronic equipment. Do not proceed with installation in affected areas until removed.
6. Verify that all fire proofing has been applied to all structural steel prior to the commencement of any work.

3.2 EQUIPMENT PROTECTION

A. Refer to specification Section 27 05 00 for additional information.

3.3 WORK PERFORMANCE

A. In addition to all requirements as stipulated by Specification Section 27 05 00 as well as all related specifications sections, the following shall also apply:

1. The Contractor shall develop a detailed network map to be utilized as a road map during the implementation of the LAN. This map shall show all segments, all interconnects between segments and all active network devices. This network map shall not include the individual nodes interconnected to each concentrator, but will have the modules, interfaces, protocols, addresses and other identifying features for each concentrator and other active device.

    a. The Contractor shall also develop a Cable Plant interconnectivity chart showing all fiber patch panels and individual identifiers for each fiber associated with the interconnectivity of each network device.

B. Job site safety and worker safety is the responsibility of the Contractor. Ensure that safe access and egress from all work areas is maintained during movement and installation of materials. Clean up all debris generated by installation activities. Keep all areas free of debris at all times.

C. Pre-installation Conferences: Include provisions to attend all pre- installation conferences at Project site in compliance with all requirements in Division 01 Specification Section and as herein specified. Review with County all methods and procedures related to installation, programming and testing of all data communications and wireless network equipment, including, but not limited to, the following:

1. Review all Coordination requirements as herein specified related to all MDF/IDF room layouts responsible by other trades.
2. Review electrical and equipment roughing-in related to all horizontal cabling infrastructures as well as other preparatory work required to be performed by other trades.
3. Review all work, equipment deliveries, installation procedures, and related scopes as required to conform to the phased construction schedule.
4. Review and finalize construction schedule and verify availability of materials, installation personnel, equipment, and any preparatory work by other trades needed to make progress and avoid delays.
5. Review required start-up, programming, endurance testing, and certifying procedures to be employed for all data communications and wireless network equipment.

D. For work on existing facilities, arrange, phase, and perform work to assure the operation of all systems for other buildings and contiguous spaces at all times. Refer to Division 01 Specification Section for additional requirements.

E. Remove all unnecessary tools and equipment, unused materials, packing materials, and debris from each area where work has been completed unless designated for storage.

F. Coordinate the installation of all data communications and wireless network equipment with the County and any applicable trades to ensure proper installation, connectivity, function and equipment performances in accordance with all related specification sections. Refer to Division 01 Specification Section for additional project coordination requirements.

1. Coordinate with all trades at the time of shop drawing submission detailing all conditions impacting the installation of all wireless access equipment, components and all appurtenances.

    a. If installation of any wireless communications components and/or related appurtenances is performed prior to coordination with other trades, which interferes with work of other trades or operation and maintenance of the facility, make necessary changes to correct the condition at no additional cost to the Owner.

G. The Contractor shall maintain a complete set of current and up to date set of shop drawings and equipment submissions at the job site at all times. The Shop drawings and all other submissions shall be marked up to reflect all as-built conditions and shall be made available for review by the County upon request.

H. The Contractor shall prepare the necessary documents required for installing, all equipment cabinets and communications room layouts. Such documents include but are not limited to:

1. Project management and quality assurance plans
2. Testing plans
3. Endurance testing procedures
4. Component and system submittal documents
5. Installation plans
6. Component design plans
7. System user documentation
8. As-built drawings and documentation

3.4 EQUIPMENT INSTALLATION

A. Install in accordance with all requirements of the Contract Documents, specification section 27 05 00, all related specification sections, manufacturer's instructions and approved submittal data.

1. All installation shall be done in conformance with ANSI/TIA 568B standards, BICSI methods, Industry standards, in addition to all data communications and wireless network equipment manufacturer's installation guidelines.
2. The installation of all data communications and wireless network equipment shall comply with all County standards as well as all applicable national and local codes pertaining to low voltage cable system installations.

    a. Refer to specification Section 27 05 00 and 27 10 00 for additional information related proper cable infrastructure installation and terminations.
    b. All Identification and Labeling shall follow Specification: 27 10 00 Structured Cabling System. Any deviation from the specification must be approved by County IT prior to installation.

3. The contractor shall adhere to the installation schedule of the general contractor and shall attend all construction meetings scheduled by the general contractor.
4. Upon structural completion of the communications room(s) and prior to the installation of any data communications network equipment inside the room, the CMAR shall consult the County in order to:

    a. Perform construction administration activities to compare as-built configuration to the design.
    b. Observe all "not-to-design" compliance issues and issue corrective advisement of actions.
    c. Upon completion of 1 and 2 above, the Communications Designer shall mark with masking tape the general layout of the equipment placement.

5. Seismic Performance: The Contractor shall furnish and install all wireless communications equipment bracing, and anchoring rated for the seismic zone of the geographical area in which the project resides and shall withstand the effects of earthquake motion and wind forces in accordance with the current editions of the IBC and ASCE/SEI 7. Refer to Division 01 and Division 26 – Hangers and Supports for additional seismic information and requirements.

B. Owner or their designated representative shall randomly perform unannounced, on-site reviews during the installation of any data communications and wireless network equipment. In addition, this person shall perform a final inspection and a complete review of the test results before the installation is accepted.

1. Upon completion of the installation, Contractor shall prepare as-built documentation of the entire SCS. This documentation shall be prepared in accordance with all requirements as herein specified as well as all requirements of Specification Section 27 05 00 and related specification sections of the of the Contract Documents.

C. Penetrations of Walls and Floors:

1. Refer to specification Section 27 05 00 for additional information.

3.5 COMMUNICATIONS CABLING REQUIREMENTS

A. Refer to specification Section 27 05 00 for additional information.

3.6 ELECTRICAL POWER DISTRIBUTION

A. Refer to specification Section 27 05 00 for additional information.

3.7 TRANSIENT VOLTAGE SUPPRESSION

A. Refer to specification Section 27 05 00 for additional information.

3.8 GROUNDING AND BONDING

A. Refer to specification Section 27 05 26 for all project grounding and bonding requirements.

3.9 EQUIPMENT IDENTIFICATION

A. In addition to all requirements as stipulated by Division 01 refer to related specification Section 27 05 00 for all labeling and identification requirements.

3.10 MAINTENANCE AND SERVICE

A. General Requirements

1. In addition to all associated requirements of 27 05 00 the following shall also apply.
2. After formal written acceptance of the installation of all data communications and wireless equipment the Contractor shall provide all services required to maintain all data communications and wireless network equipment in fully operational state for the warranty period as specified by Division 01 as well as all related specification sections

   a. Provide all necessary labor, materials and related appurtenances as required for performing scheduled adjustments or other non-scheduled work. Impacts on facility operations shall be minimized when performing scheduled adjustments or other non-scheduled work related to the installation and termination of all horizontal cabling infrastructures. Refer to Division 01 specification section for additional requirements.

3.11 WARRANTY

B. Refer to specification Section 27 05 00 for additional information.

3.12 FIELD SERVICES

A. In addition to all requirements as specified by Division 01, Specification 27 05 00 as well as all related Division 27 Specification Sections, for the proper installation of all data communication and wireless network equipment.

1. At the minimum, all scopes of work shall include but limited to the following requirements;

   a. Test all grounding and bonding conductors prior to start-up and commissioning of any, horizontal cabling infrastructures, communications components, devices, equipment and/or systems.

B. Endurance Testing

1. A system endurance test shall be provided for all application-based systems to ensure whether the application, programming or cabling infrastructure can withstand the anticipated processing and performance capabilities based on the system's current functional loads.

    a. Provide sufficient personnel to monitor the endurance testing on a continuous 24 hours per day basis, including weekends and holidays for a period a of not less than seven (7) days.
    b. Coordinate and schedule endurance test with County a minimum of twenty-one (21) days prior to the commencement of the test

2. Start test after:

    a. Successful completion of performance verification testing.
    b. Training as specified has been completed.
    c. Correction of deficiencies has been completed.
    d. Receipt of written start notification from the County.

3. Monitor all systems during endurance testing. Coordinate monitoring with the County.
4. Recording: Record data on approved forms so as to provide a continuous log of systems performance. Include:

    a. Date and time for all entries.
    b. Name of individual making entry.
    c. Environmental conditions.
    d. Owner activities in process.
    e. Description of all alarm annunciations, responses, corrective actions, and causes of alarms. Classify as to type of alarm.
    f. Memory consumption to determine potential failures or risk
    g. Description of all equipment failures, including software errors.
    h. Description of all maintenance and adjustment operations performed on system.
    i. Daily and weekly tabulations.
    j. Daily entries of performance data shall be reviewed by the Owner's representative designated to observe monitoring of system.

5. The County may terminate testing at any time when any system, sub-system, system component or cabling infrastructure fails to perform as specified. Upon termination of testing, the Contractor shall commence an assessment period.

C. Adjustment, Correction, and Maintenance

1. During endurance testing, make adjustments and corrections to system only after obtaining written approval of the Owner or authorized representative.
2. During endurance testing, perform required maintenance on systems including provision of replacement parts.

D. Final Inspection and Acceptance

1. After endurance testing is complete, review tabulated records with the County.
2. The Contractor will not be responsible for failures caused by:

    a. Outage of main power in excess of backup power capability provided that automatic initiation of all backup sources was accomplished and automatic shutdowns and restarts of systems performed as specified.
    b. Failure of any Owner furnished power, communications, and control circuits provided failure was not due to Contractor furnished equipment, installation, or software.
3. When performance of integrated system does not fall within the above rates, determine cause of deficiencies, correct, and retest.

    a. When requested by the County, extend monitoring period for a time as designated by the Owner or authorized representative.
    b. Submit final report of endurance testing containing all recorded data.

4. The Contractor shall submit written certification that:

    a. The Contract Documents have been reviewed.
    b. All required as-built documentation has been submitted and approved by the County.
    c. The Project had been inspected for compliance with the Contract Documents.
    d. The Work has been completed in accordance with the Contract Documents.
    e. The equipment and systems have been tested and are shown operational in the presence of the County.
    f. The Project is completed and is ready for final inspection.

E. Contractor Requirements
1. Contractor shall provide sufficient skilled labor to complete the installation and verification of conformance to all installation requirements related to communication equipment cabinets and communications room layout.

    a. Contractor shall have a minimum of three years' experience installing communications equipment cabinets and associated appurtenances. All installers assigned by the Contractor to the installation shall be certified by the factory to install and test the provided products.

2. Adjustment, Correction, and Completion:

    a. Correct deficiencies and retest all affected horizontal cabling infrastructures as well as all appurtenances.

        1) Make necessary adjustments and modifications to all backbone and riser infrastructure installations after obtaining approval of the County

            a) Completion: Performance verification test shall be complete when testing or retesting of each component has produced a

positive result and has been approved in writing by the Owner or authorized representative.

b. Acceptance Requirements

1) Contractor's RCDD shall warrant in writing that 100% of the installation meets all requirements of Division 01, Specification 27 05 00 as well as all requirements as herein specified.

3.13 TRAINING

A. Refer to specification Section 27 05 00 for additional information.

3.14 PROJECT CLOSEOUT REQUIREMENTS

A. Refer to specification Section 27 05 00 for additional information.

END OF SECTION 27 21 00

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, and all related Specification Sections, shall all apply to this Section.

B. Related specification sections:

1. Refer to Specification Section 27 05 00 for additional information.

C. Reference Symbols:

1. All device symbols are defined by the appropriate symbol schedule on the symbols and abbreviations sheet in the systems drawing package. Not all device symbols indicated may be required for the project.
2. Due to the scale of the drawings, symbols are shown on drawings as close as possible to the mounting location. Contractor shall coordinate exact locations with all drawings and affected trades prior to submittal of shop drawings.

   a. The installing Contractor shall coordinate exact locations with all security and telecommunications drawings and site plan drawings as well as all affected trades prior to submittal of any shop drawings.

D. Abbreviations:

1. Refer to Specification Section 27 05 00 for additional information.

E. Definitions:

1. Refer to Specification Section 27 05 00 for additional information.

1.2 SUMMARY

A. The MUFIDS described herein includes the requirement for compatible functionality, software and hardware to post contents within the project spaces including, but not limited to display flight, baggage, gate, airline branding and visual paging information.

B. The Contractor shall be responsible for providing all equipment, devices, system components, patch cables, installing, programming and development of display contents, commissioning, and testing of all displays and equipment in accordance with all related Division 27 Specification Sections.

1. All software and hardware shall be commercially available off-the-shelf (COTS) type.

C. The scope of work shall include all hardware software and programming required to implement the MUFIDS platform and shall include all work, materials, infrastructure, equipment, software, network interfaces, and programming as required to provide physical interface for full connectivity. Additionally, the contractor shall provide the following as part of the MUFIDS scope.

1. Power coordination with other trades as required for display locations.
2. Millwork and structural attachment coordination with other trades as required.
3. Construction scheduling and tasks required to support of project coordination.

1.3 REFERENCES

A. Refer to Specification Section 27 05 00 for requirements.

1.4 SYSTEMS DESCRIPTIONS

A. Refer to Specification Section 27 05 00 for additional information.

1.5 SUBMITTALS

A. Refer to Specification Section 27 05 00 for additional information.

1.6 QUALITY ASSURANCE

A. Refer to Specification Section 27 05 00 for additional information.

1.7 DELIVERY STORAGE AND HANDLING

A. Refer to Specification Section 27 05 00 for additional information.

1.8 RECORD DOCUMENTS

A. Refer to Specification Section 27 05 00 for additional information.

1.9 OPERATIONS AND MAINTENANCE

A. Refer to Specification Section 27 05 00 for additional information.

1.10 SOFTWARE AGREEMENT

A. Refer to Specification Section 27 05 00 for additional information.

1.11 EXTRA MATERIAL

A. Refer to Specification Section 27 05 00 for additional information.

PART 2 - PRODUCTS

2.1 MANUFACTURED PRODUCTS

A. Refer to Specification Section 27 05 00 for additional information.

2.2 MUFIDS DISPLAY TYPES AND CONFIGURATION REQUIREMENTS

A. MUFIDS Display Requirements:

1. General:

a. The Contractor shall coordinate location of displays and other devices with structural elements, electrical power, architectural millwork, to plan locations, attachments, accessibility, and operations for each display planned for the Project spaces.

B. MUFIDS Displays planned for the Project Spaces shall include the following display types and contents:

1. Curbside Drop Off Point Displays – Airline branding, dual sided, exterior rated, LED dynamic signage. Minimum 8-inch character height. Monochrome or full color.
2. Ticket Counter Overhead Displays - Airline branding and ticketing information located over ticketing counters - 55" LCD flat panels.
3. Ticket Counter Backwall Displays - Airline branding and ticketing information located behind ticketing counters - 55" LCD flat panels.
4. Video Bank Displays - Arrival / Departure / Visual Paging / Mass Notification -5 screen Banks of 55" LCD flat panels.
5. TSA SSCP queuing spaces -TSA wait times and -3-1-1 types passenger information on screening process.
6. Additional display types and locations -TBD.

C. Video Processors: The MUFIDS shall use small form factor "Intel NUC" type video processors provisioned with latest software and hardware configuration MUFIDSMUFIDS. The video processors shall be provided in dedicated 1:1 for each display planned for in the project.

D. Dynamic Signage Signaling: LED dynamic signage will be communicated with standard Ethernet signaling (802.3) using either copper or fiber optic cabling. Fiber optic interface

to dynamic signage will require close coordination with passive cable plant and network switch design and installation.

E. The Contractor shall be responsible for integration of the MUFIDS with the new replacement terminal Local Area Network (LAN).

2.3 SYSTEM AND SOFTWARE REQUIREMENTS

A. General Requirements

1. The Contractor shall furnish and install all equipment, component and appurtenances as required for a fully functional MUFIDS. The displays and processors planned for the new spaces in the project shall require provision of software, software licenses, programming and integration.

B. Software

A. Refer to Specification Section 27 05 00 for requirements.

C. Software Licenses

A. Refer to Specification Section 27 05 00 for requirements.

2.4 HARDWARE REQUIREMENTS

A. General

1. The MUFIDS, as defined in this document, shall include all configured hardware necessary for full operability. The Contractor shall supply all patch cables, power cords, displays, display mounting attachment hardware, and video processors equipment necessary to interconnect all system hardware. All hardware and materials shall be new.
2. The hardware selected shall be "standardized to maintain uniformity, warranty and spares optimization for the MUFIDS program.

B. MUFIDS hardware products shall include, but not be limited to:

1. 55" LCD Video Displays:

a. Basis of design manufacturer: NEC Displays

1) NEC P463 commercial Grade 24/7
2) NEC P484 commercial Grade 24/7

2. Video Processors:

a. Basis of design manufacturer: Intel

1) Intel NUC 8iXXX

3. Video display mounting and attachment brackets:

a. Basis of design manufacturer: Peerless

1) Pop-out
2) Tilt

4. LED Dynamic Signage Displays

a. Basis of design manufacturer: Daktronics

1) AF Series LED Signage
2) GS Series LED Signage

PART 3 - EXECUTION

3.1 COORDINATION

A. Refer to Specification Section 27 05 00 for additional information.

3.2 EQUIPMENT PROTECTION

A. Protect all materials, equipment, devices or components permanently installed and/or stored on the job site. Protect all materials, equipment, cabling, devices or components during construction and after installation, provide appropriate protection of all materials, equipment, components and/or devices until time of substantial completion. All materials, equipment, components and/or devices shall be protected during shipment and storage against any physical damage, dirt, moisture, cold, snow or rain:

1. During installation, enclosures, racks\cabinets, equipment, controls, controllers, circuit protective devices, and other like items, shall be protected against entry of any foreign matter; and shall be vacuum cleaned both inside and outside before testing and operating and repainting if required.

3.3 WORK PERFORMANCE

A. In addition to the requirements of Specification Section 27 05 00, comply with the following:

1. Refer to related specification sections for additional project coordination requirements. In addition to the requirements defined in this Specification Section,

the contractor shall coordinate and meet all requirements addressed in Division 26, Division 27 and Division 28 Specification Section.

3.4 EQUIPMENT INSTALLATION

A. All system equipment installations shall be in accordance with good engineering practices, NEC, local building codes, and all manufacturer's requirements. Cable terminations at all equipment locations shall comply with all state and local electrical codes. All wiring shall test free from all grounds, shorts, stray voltages and EMI.

3.5 INSTALLATION REQUIREMENTS

A. In addition to all demonstration and training as specified by Division 01, Specification Section 27 05 00 and related Division 27 Specification Sections, system installation shall be provided in accordance with all requirements of this Section.

B. General

1. System/Hardware and mounting must comply with IBC Seismic Requirements.
2. Where undefined by codes and standards, Contractor shall apply a safety factor of at least 2 times the rated load to all fastenings and supports of system components.

3.6 COMMUNICATIONS CABLING REQUIREMENTS

A. Refer to Specification Section 27 05 00 for additional information.

3.7 ELECTRICAL POWER DISTRIBUTION

A. Comply with the requirements of Specification Section 27 05 00.

3.8 TRANSIENT VOLTAGE SUPPRESSION

A. Comply with the requirements of Specification Section 27 05 00.

3.9 GROUNDING AND BONDING

A. Comply with the requirements of Specification Section 27 05 00.

3.10 EQUIPMENT IDENTIFICATION

A. Refer to specification Section 27 05 00 for additional information.

3.11 MAINTENANCE AND SERVICE

A. Refer to specification Section 27 05 00 for additional information.

3.12 WARRANTY

A. Refer to specification Section 27 05 00 for additional information.

3.13 FIELD SERVICES

A. Refer to specification Section 27 05 00 for additional information.

3.14 TRAINING

A. Refer to specification Section 27 05 00 for additional information.

3.15 PROJECT CLOSEOUT REQUIREMENTS

A. Refer to specification Section 27 05 00 for additional information.

END OF SECTION 27 42 16

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Project drawings and general provisions of the Contract, including but not limited to all; General and Supplementary Conditions, Division 01 Specification Sections and stipulated Specification Sections shall apply to this section.

B. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

C. Related Sections:

1. Division 07 – Through-penetration Firestop Systems
2. Division 08 – Door Hardware
3. Division 26 – Common Work Results for Electrical
4. Division 26 – Low Voltage Electrical Power Conductors and Cables
5. Division 26 – Grounding and Bonding for Electrical Systems
6. Division 26 – Hangers and Supports for Electrical Systems
7. Division 26 – Raceways and Boxes for Electrical Systems
8. Division 26 – Identification for Electrical Systems
9. Division 27 – Section Common Work Results for Communications Systems
10. Division 27 – Network Communications System
11. Division 28 – Physical Access Control System (PACS)
12. Division 28 – Video Surveillance System (VSS)
13. Division 28 – Fire Alarm System

D. Reference Symbols:

1. All device symbols are defined by the appropriate symbol schedules. Because of the scale of the drawings, symbols are shown on drawings as close as possible to the mounting location.

   a. Contractor shall coordinate exact locations with all architectural drawings, mechanical, electrical drawings, reflected ceiling and furniture plans, door hardware specifications as well as all affected trades prior to submittal of any shop drawings.

E. Abbreviations:

1. ACG: Automatic Gain Control
2. ACR: Attenuation to Crosstalk Ratio.
3. ACS: Access Control System
4. ADA: Americans with Disabilities Act
5. AHJ: Authority Having Jurisdiction
6. ASTM: American Society for Testing Materials
7. ASIS American Society for Industrial Security
8. ATP: Acceptance Test Plan
9. AUI: Attachment Unit Interface.
10. AWS: Advanced Wireless Service
11. A/V: Audio Visual Systems – For purposes of this specification section A/V

systems shall include all Media Management, Video Broadcasting, Intercommunications (Paging/Public Address, Clock, Auxiliary Sound), Video Intercom, Emergency Communications, Mass Notification, Master Antenna (MATV) and Distance Learning Systems

12. AVI: Audio Visual Systems Integrator: Shall be a qualified contractor experienced in the installation and certification of A/V systems. The AVI contractor shall be responsible for the design, testing, and certification of all audio/visual systems including, but not limited to: Intercommunications, TV Distribution, Audio/Visual, Master Antenna and Bi-Directional Antenna systems as well as all structured cabling systems supporting these technologies.
13. BACnet: A communications protocol for building automation and control networks as outlined in ISO 16484-5 and ASHRAE/ANSI Standard 135.
14. BAS: Building Automation System
15. BDA: Bi-Direction Amplifier
16. BICSI: Building Industry Consultant Services International - International organization whose primary objective is to enhance the reputation and skills of companies and individuals employed in the telecommunications and security industries by ensuring that current and developing standards are maintained.
17. BRS: Broadband Radio Service
18. BTS: Base Transceiver Station
19. CATV: Community Antenna Television
20. CDMA: Code Division Multiple Access
21. CEA: Consumer Electronics Association
22. CFR: Code of Federal Regulations
23. C/N: Carrier-to-Noise Ratio
24. CP: Consolidation Point - Local Interconnection Point between horizontal cables from the building IDF/MDF rooms and horizontal cables for the furniture drops.
25. CPU: Central Processing Unit
26. CSU: Channel Service Unit
27. CWDM: Coarse Wave Division Multiplexing
28. dB: Decibel
29. DAQ: Delivered Audio Quality
30. DAS: Distributed Antenna System
31. DDC: Direct Digital Controller / Device Display Controller
32. DGP: Data Gathering Panel – A component of the Physical Access Control System (PACS) located at each door or portal location that communicates, stores and processes information received from readers, reader modules, input modules, and output modules with the Security Management System CPU and software.
33. DIB: Door Interface Box
34. DMZ: Demilitarized Zone– A firewall configuration for securing local area networks (LANs).
35. DP: Demarcation Point - The point of interface between the Communications Networks, MATV, any Auxiliary Systems, and the associated Service Providers or Public Utilities. Also known as Entrance Facility. Shall also serve as the primary termination point for all incoming OSP cabling as well as the primary main grounding bus-bar for all communications systems. Refer to project documents for exact location and termination

requirements.

36. DSU: Data Service Unit.
37. DWDM: Dense Wave Division Multiplexing
38. EBS: Educational Broadband Service
39. EIA: Electronic Industries Alliance
40. ELFEXT: Equal Level Far End Crosstalk.
41. EMI: Electromagnetic interference.
42. EMT: Electrical Metallic Tubing – Also known as thin-wall conduit.
43. ESMR: Enhanced Specialized Mobile Radio
44. EVAC: UL Listed Emergency Voice Evacuation System. Not to be confused with the building Public Address/Intercom, Intercommunications and/or Mass Notification systems.
45. FAAP: Remote Fire Alarm Annunciator Panel
46. FACP: Fire Alarm Control Panel
47. FAS: Fire Alarm System
48. FASI: Fire Alarm System Integrator
49. FCC: Federal Communications Commission
50. FEXT: Far End Crosstalk.
51. GFCI: Ground fault circuit interrupter.
52. GIW: Gate Input Workstation
53. GUI: Graphic User Interface – A specialized program employing graphical display maps of a facility and/or site which, also provides a manual user interface for all system functions and operations by utilizing control and annunciation icons from dedicated human machine interface terminals.
54. HMI: Human/Machine Interface – A Computer-operated, video control terminal complying with FCC Part 15 CFR Title 47, Subparts A and B, and shall utilize multiple dynamic GUI based displays for annunciation and control LCD flat panel computer monitor or display screen as defined by related specification sections.
55. IATA: International Air Transport Association - The global trade association for the airline industry
56. IBC: International Building Code
57. ICT: Information Communications Technology – For purposes of this specification section ICT shall include all communications systems including but not limited to all Data, Telephone, BAS, Intercommunications (Paging/Public Address), TV Distribution Systems (MATV) and Audio-Visual Systems (A/V) Surveillance Systems and IP based Access Control.
58. ICTI: Information Communications Technology Integrator – Shall be a qualified contractor experienced in the installation and certification of all data, telecommunications. The ICTI shall be responsible for the design, testing, and certification of Data, Telephone communications systems and all structured cabling systems supporting these technologies.
59. IDF: Intermediate Distribution Frame – The room/space that shall serve as the local termination point for all horizontal and backbone cabling. Also shall be known as Equipment Room (ER), Horizontal Cross-Connect (HC) or Floor Distributor (FD).
60. iEDN: Integrated Enhanced Digital Network
61. IEEE: Institute of Electrical and Electronics Engineers
62. IFP: Intelligent Field Panel

63. IO: I/O Input/Out – Commonly associated with dry contact relay-based digital integration.
64. IP: Internet Protocol
65. IR: Infrared
66. ISO: International Organization for Standardization
67. LAN: Local Area Network
68. LCD: Liquid Crystal Display
69. LED: Light-Emitting Diode
70. LMR: Land Mobile Radio
71. LTE: Long Term Evolution
72. LV: Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.
73. MATV: Master Antenna Television: Shall include all TV and media management distribution cabling, termination jacks, head-end components, equipment racks, amplifiers, projection equipment, and video monitoring devices as defined by the project drawings and related specification sections.
74. Mbps: Megabits per second.
75. MDF: Main Distribution Frame: The room/space that shall serve as the primary termination point for all backbone cabling to each IDF locations and horizontal connection point for local communication drops. May also serve as a local IDF location as well as the cross-connection and interconnection of all entrance cables from the DP for all PSTN and WAN connections. Also, shall be known as Main Cross Connect (MC), Telecommunications Room (TR) and/or Campus Distributor (CD)
76. M-JPEG: Motion – Joint Photographic Experts Group
77. MPEG: Moving Picture Experts' Group.
78. MTBF: Mean Time Between Failure
79. NEC: National Electric Code
80. NEMA: National Electrical Manufacturers Association
81. NEXT: Near End Crosstalk
82. NFPA: National Fire Protection Association
83. NMM: Network Management Module
84. NMS: Network Management System
85. NRTL: Nationally Recognized Testing Laboratory
86. NTSC: National Television System Committee.
87. NVR: Network Video Recorder
88. NVW: Network Video Workstation
89. OAR: Owner's Authorized Representative
90. OSP: Outside Plant – All cabling associated with building services supporting the incoming service connections to Service Providers, Public Utilities, and Wide Area Networks.
91. OTDR: Optical Time Domain Reflectometer
92. PA/PG/ECS: Public Address / Paging / Emergency Communications System.
93. PCS: Personal Communications System
94. POTS: Plain Old Telephone Service – Analog Telephone Circuit used for the connection of fax machines, BAS and FAS communications devices and shall be wired upstream of the facility's telephone switch.
95. PSP: Physical Security Professional as registered by the American Society of

Industrial Security-International (ASIS)

96. PSTN: Public Switched Telephone Network – Connection to local telephone utility providing local telephony communications service.
97. RCDD: BICSI-accredited Registered Communications Distribution Designer
98. PSN: Public Safety Network
99. RFI: Radio-frequency interference / Request for Information
100. RGS: Rigid Galvanized Steel conduit: Galvanized steel tubing, with a tubing wall that is thick enough to allow it to be threaded.
101. RoF: Radio-over-Fiber
102. RoHS: Restriction of Hazardous Substances
103. RSL: Received Signal Level
104. RSRP: Reference Signal Receive Power
105. RS-232: A TIA/EIA standard for asynchronous serial data communications protocol between terminal devices. This standard defines a 25-pin connector and certain signal characteristics for interfacing computer equipment.
106. RS-485: A TIA/EIA standard for multipoint communications protocol.
107. SCADA: Supervisory Control and Data Acquisition – A system used to monitor and control the operation and status of facility systems scattered over wide geographic areas.
108. SISO: Single-Input, Single-Output
109. SMR: Specialized Mobile Radio
110. SMS: Security Management System – A system incorporating security alarms, door controls, emergency intercoms/paging, duress alarms, and surveillance systems all integrated through a single operating platform, providing centralized command and control capability for the various systems via dedicated human machine interface terminals.
111. SMS: Short Message Service
112. SNIR: Signal-to-Noise Interference Ratio
113. SNMP: Simple Network Management Protocol
114. SOW: Statement of Work
115. TCP/IP: A standard protocol stack on which the Internet and data communications networks operate
116. TGB: Telecommunications Grounding Busbar – Located in each IDF
117. TIA: Telecommunications Industry Association
118. TMGB: Telecommunications Main Grounding Busbar – Located at the building DP/MDF
119. TP: Transition Point – A location in the horizontal cabling where flat under carpet cable transitions to a horizontal cabling consolidation point (CP).
120. TSB: Technical Service Bulletin
121. TVSS: Transient Voltage Surge Suppressor
122. UPS: Uninterruptible Power Supply
123. UTP: Unshielded Twisted Pair
124. VLAN: Virtual Local Area Network
125. VoIP: Voice Over IP telephone Network
126. VPN: Virtual Private Network– A technique made possible by switching technologies that permits the logical grouping of any number of network devices into one or more sub- networks.
127. VSS: Video Surveillance System
128. VSWR: Voltage Standing Wave Ratio

129. WAN: Wide Area Network
130. WAP: Wireless Access Point
131. WLAN: Wireless Local Area Network

F. Definitions:

1. Contract Documents: The documents consisting of the Form of Agreement between Owner and Contractor, Conditions of the Contract, (General, Supplementary, and other Conditions), Drawings, Specifications and all Addenda issued prior to the execution of the Contract.
2. Contract Drawings: The drawings that form a part of the Contract Documents that provides the graphical representation of the project requirements intended design and/or performance criteria to be delivered by the Contractor.
3. Reference Drawings: A drawing and/or set of drawings produced by a proprietary supplier, manufacturer, subcontractor, or fabricator included in the Contract Documents for informational purposes, providing specific information related to the installation of related appurtenances, components, devices, hardware, products, and/or systems. Reference Drawings shall also include any Contract Drawings from prior bid packages that may have pertinent information or require coordination of trades related to this contract.
4. Shop Drawings: A drawing and/or set of drawings produced by the contractor, supplier, manufacturer, subcontractor, or fabricator as a detailed representation of the proper installation of the related, appurtenance, component, device, hardware, product, and/or system to be delivered in conformance to the requirements of the Contract Documents.
5. Owner: Destin-Fort Walton Beach Airport

1.2 SUMMARY

A. This Section contains the overall requirements associated with all Division 28 Specification Sections, and includes the project design intent for all system cabling and equipment related to the installation of the following systems:

1. Access Control System (ACS)
2. Video Surveillance System (VSS)
3. Addressable Fire Alarm System

B. In addition, this section shall address all requirements for submittals, quality assurance, product handling, record documents, project conditions, installation, system performance, demonstrations, testing, and certifications for all scopes of work related to network communication cabling for this project scope of work. Refer to related Division 14, 21, 23, 26, 27 and 28 specification sections and all contract drawings for additional information.

1. The Electronic Security System Integrator (ESSI) shall be sub-contractors to the Contractor. This integrator shall have overall responsibility for all system layouts, equipment and all technical support related to all Division 28 scopes of work and shall ensure full coordination of all work as required to provide fully operational systems in accordance with all requirements of the Contract Documents, applicable Codes and Standards.

a. The Contractor shall provide all systems in accordance with the Division 28 specifications, and all related drawings and specification sections, all of which shall form in part and/or in whole what is herein known as the Contract Documents.
b. All sub-contractors shall meet the minimum technical capabilities, certifications, and licensing requirements as defined by the "Quality Assurance" chapter as specified herein as well as all related specification sections.

1) All TCP/IP-based systems cabling shall be furnished under this Division 28 scopes of work and shall installed and tested in accordance with the requirements of specification section 27 05 00 and all related Division 27 specifications.

2. The Fire Alarm System Integrator (FASI) shall be a sub-contractor to the Contractor. This integrator shall have overall responsibility for all system layout, equipment and all technical support related to all Division 28 scopes of work and shall ensure full coordination of all work as required to provide fully operational systems in accordance with all requirements of the Contract Documents, applicable Codes and Standards.

c. The Contractor shall provide all systems in accordance with the Division 28 specifications, and all related drawings and specification sections, all of which shall form in part and/or in whole what is herein known as the Contract Documents.
d. All sub-contractors shall meet the minimum technical capabilities, certifications, and licensing requirements as defined by the "Quality Assurance" chapter as specified herein as well as all related specification sections.

3. It shall be the responsibility of the Contractor to provide all necessary cabling, electrical power, controls, processing equipment, devices, components, cable terminations, equipment racks/cabinets, software, programming, testing, commissioning and all appurtenances as required to provide complete and fully operational systems in accordance with all requirements of the Contract Documents.

C. The installation, performance, features, functions, software and programming criteria as specified herein as well as all related drawings and Division 28 specification sections have been designed to offer the maximum system efficiency, ease of operation, occupant safety and the protection of equipment as recommended by the Owner and Owner's Authorized Representative (OAR).

1. Any deviations from the specified criteria shall be documented, reviewed, and agreed to in writing by The Owner prior to submission of bids. Refer to Division 01, and all related Division 28 specification sections for any substitutions and/or project deviation requests.

a. The required information shall include but not be limited to: reason for deviation, all differences in performance, operation, and function from the herein specified requirements, all benefits, and added features to the Owner and OAR as a result of the deviations and any additional incurred costs to the Owner for maintenance and long-term ownership.
b. Failure to provide the Owner and OAR with the required information shall result in any shop drawing submissions being returned for non- conformance with the contract requirements.

2. The contractor and all sub-contractors for this work shall have read all of the General Conditions, Special Requirements, General Requirements, and all related specification sections and in the execution of all work shall be bound by all of the conditions and requirements therein.

a. Prior to the submission of the Bid any discrepancies or inconsistencies noted within these specifications and/or the project drawings shall be brought to the immediate attention of the Owner and OAR.
b. Where ambiguity exists between the project specifications and the contract drawings, the superior in system performance, shall prevail, and shall be delivered by the Contractor at no additional expense to the project.

B. All device symbols are defined by the appropriate symbol schedules as indicated by the symbol and abbreviation drawing sheets for each discipline. The Contractor shall coordinate exact locations with all architectural, mechanical, electrical, reflected ceiling, furniture drawings and door hardware specifications as well as all affected trades prior to submittal of bids.

1. All symbols are shown on the contract drawings as close as possible to their intended location. Contractor shall coordinate the installation of all equipment, devices, controls, components, cabling conduits/raceways and integration of other systems with all affected trades and specified system integrators. The contractor shall document all coordination requirements at the time of shop drawing submission.
2. Drawings for this work are diagrammatic and intended to convey the extent, general arrangement, and locations of the work. Because of the scale of the drawings, certain basic items such as access panels, conduits, cabinet sizes, penetration sleeves, pull boxes, back-boxes and junction boxes may or may not be shown on the contract drawings. Include all items where required by code and related specification sections for proper installation of all work.

D. Project specifications and drawings may not deal individually with every part, control, device, software or programming, which may be required to produce the equipment and/or system performance specified or as necessary for the installation and/or integration of any systems in accordance with all requirements of the Contract Documents.

1. The contractor shall include all equipment, materials, components, and appurtenances where required by code, by manufacturers' recommendations, and all related Contract Documents in order to ensure proper installation operation and integration of all components, equipment, devices and/or systems.

a. Include such items and components, as required, for complete operational systems as defined by the project documents, whether or not specifically indicated. The Contractor shall be responsible for providing conduits/raceways, cabling, cable terminations, controls, systems, equipment, materials, devices, components, electrical power, software, programming, commissioning, testing and all appurtenances. Additionally, the Contractor shall provide the integration of ancillary systems and/or Owner provided equipment/components/systems where indicated on the Contract drawings.

2. The contractor shall be responsible for providing all wiring, conduits, backboxes and terminations for all equipment devices and systems. In addition, the contractor shall be responsible for providing all coordination, programming, testing, commissioning and certification of all equipment, devices and/or systems as required for the proper integration and operation all related systems in accordance with the requirements of the Contract Documents.

3. The Contractor shall coordinate with all ESS scopes of work with the Division 27 integrator, fire alarm and security system Contractor and sub-contractors as well as all other applicable trades and sub-contractors in the submittal of shop drawings and the installation of all equipment, devices, and systems. All shop drawings shall detail space

conditions in order to accommodate other concerned trades, all equipment and device locations are subject to final review by the Owner and OAR.

a. If installation of equipment, raceways, cable trays, and/or conduit is performed prior to coordination with all other trades, which interferes with work of other trades or the performance of the system, the contractor shall make necessary changes to correct the condition at no additional cost to the Owner and OAR.

4. The contractor shall coordinate the installation of all cabling and conduits for all Division 28 systems with all applicable trades, equipment providers, and related system integrators to ensure proper operation and function of all systems, devices, components, equipment, and/or systems integration.

a. The fire alarm and access control systems shall provide the proper interface to the building automation system as required for proper operation of all life safety functions as indicated by the contract documents.
b. Provide all cabling, conduits, terminations, and programming to properly interface the fire alarm and access control systems with all related mechanical, elevator and security systems in accordance with all applicable life safety codes and/or in accordance with all requirements of the project drawings and related specifications.
c. The ESSI and FASI sub-contractors shall coordinate with all applicable systems contractors to ensure the proper integration and performance requirements of all Division 28 systems as required by Code, Contract Documents, and the AHJ.

E. All Division 28 scopes of work shall include the necessary labor, software, equipment, materials, devices, cabling, conduits and electrical power as well as the performance of all system programming, testing and commissioning as required to provide fully operational system in accordance with all requirements of the project documents.

1. The Contractor shall furnish and install all software, and system components as well as all necessary modifications and programming changes for the proper installation of all Video Surveillance and Physical Access Control system components as required to insure continuity of operations between all electronic security systems.

F. All Division 28 systems work shall include the labeling of all wire terminations and enclosure locations. All wiring shall terminate on fixed terminal strips, punch blocks, or patch panels in accordance with all requirements of the project drawings and related specifications.

1. No splices shall be permitted in underground maintenance holes and non-accessible junction boxes. All junction boxes containing any system splices shall be uniquely identified.

G. All mounting heights and accessibility to all equipment requiring access by individuals with disabilities shall comply with ANSI A117.1 requirement.

1. All equipment enclosures located outside or in all areas with exposure to the weather or in high humidity areas shall be NEMA 4X enclosures and rated for that application.
2. All devices, components, or equipment installed on the exterior of the facility shall be provided in accordance with all manufacturers' requirements to ensure the proper operation when exposed to the environmental conditions and/or average annual lowest temperature that can be anticipated for the geographic region of the facility.
3. All interior devices exposed to the general population shall be installed in secured equipment enclosures and installed in such a manner that resists tampering and/or removal without the use of specialized tools.

H. All work shall be neat in appearance, free of rough edges, scratches, blemishes, cracks and exposed gaps. All equipment shall be secured to the mounting surface and fastened with hardware approved by the manufacturer and capable of supporting the rated load. All cables within enclosures shall be neatly routed and tie wrapped at 6 inches on center. All wire splices shall be terminated on terminal strips and/or soldered in place. Any splices utilizing wire nuts shall not be acceptable.

I. Use of Premises

1. The Contractors shall have limited use of premises for construction operations only as required to meet the scope of work as delineated by the Contract Documents.
2. The Contractor shall design, prepare, schedule, and coordinate all scopes of work without disruption of any existing system functions or the daily operation of the existing facility. All cabling and equipment shall be installed in such a manner that all new controls, equipment and/or devices shall be installed, programmed and tested prior to modification, switch over and/or disconnecting of any existing systems.

   a. Include all costs related to any phased construction methodologies having to do with the scope of work defined herein, including, but not limited to, all necessary temporary equipment, devices, components or systems as well as any labor costs associated with any installation, commissioning, testing demolition of any technology systems required to be performed after normal business hours of the facility.
   b. Prior to the disabling, modifications, switchover and/or demolition of any existing system components and/or cabling, all new system components, equipment, conduits, cabling, shall be in place, tested and fully operational.

3. Contractor shall plan, schedule and install all scopes of work in accordance with all requirements of the project construction schedule. Refer to related specification sections for additional information related to project scheduling and facility access.

   a. The contractor shall coordinate all installation and demolition activities so as not to disrupt the daily routine of the facility or negatively impact the integrity of the facility's security and life safety measures.

B. Coordination

1. The Contractor shall coordinate with all Division 27 integrator, Division 28 Contractors, and sub-contractors as well as all other applicable trades in the submittal of shop drawings and the installation of all equipment, devices, and systems. All shop drawings shall detail space conditions in order to accommodate other concerned trades, all equipment and device locations are subject to final review by the Owner and OAR.

   a. If installation of equipment, raceways, cable trays, and/or conduit is performed prior to coordination with all other trades, which interferes with work of other trades or the performance of the system, the contractor shall make necessary changes to correct the condition at no additional cost to the Owner and OAR.
   b. The Fire Alarm and Access Control Systems shall provide the proper interface to the Building Automation System (BAS) as required for proper operation of all smoke control and life safety functions in accordance with Contract documents.

      1) Provide all cabling, conduits, terminations, and programming to properly interface the fire alarm and access control systems with all related mechanical, elevator and security systems in accordance with all applicable life safety codes and/or in accordance with all requirements of the project

drawings and related specifications.

c. The ESSI and FASI sub-contractors shall coordinate with all applicable systems Contractors to ensure the proper integration and performance requirements of all Division 28 systems as required by Code, Contract Documents, and the AHJ.

2. Where applicable, the Contractor shall coordinate all service, rework, and relocation of existing utilities prior to bid. Bid shall include all work required for any connections/interfacing with existing systems.

a. Contractor shall coordinate all work with vendors for rework, relocation, and addition of equipment and devices, including any modification to existing system infrastructure.

3. Coordinate all work involving tenant leased areas or equipment for rework, relocation, and addition of equipment and devices, including any modification to existing system infrastructures with the Owner and ORA.

1.3 REFERENCES

A. References to industry and trade association standards as well as all building codes are minimum installation requirements. The codes, standards, and agencies listed below shall form a part of all related specification sections and all work shall comply with the latest adopted standards.

B. Where the contract drawings and specifications mandate a greater requirement or performance than those specified by any of the below referenced codes and standards, the Contract Documents shall then be the governing requirements for this project. The minimum codes and standards to be applied for this project shall be the following;

1. National Fire Protection Association:

a. NFPA-70: National Electrical Code
b. NFPA-72: National Fire Alarm and Signaling Code
c. NFPA – 90A Standard for the Installation of Air-Conditioning and Ventilating Systems
d. NFPA – 92B Standard for Smoke Management Systems in Malls, Atria, and Large Spaces
e. NFPA-101: Life Safety Code
f. NFPA – 415 Standard on Airport Terminal Buildings, Fueling Ramp Drainage, + Loading Walkways
g. NFPA -731: Standard for the Installation of Electronic Premises Security Systems

2. Federal Communications Commission:

a. FCC Regulations Part 15 Title 47.

3. International Code Council

a. International Building Code – International Code Council
b. International Mechanical Code – International Code Council
c. Accessible and Usable Buildings and Facilities (A117.1)

4. Institute of Electrical and Electronic Engineers (IEEE)

a. IEEE 802.3 - "Carrier Sense Multiple Access with Collision Detection," and all applicable supplements a through af".
b. IEEE 802.3.u-100 - "Base T/100-Base-TX, Fast Ethernet"

c. IEEE 802.3.z - "Gigabit Ethernet"
d. IEEE 802.3. ab - "1000 Base T"
e. IEEE 802.3.ae - "10 Gigabit Ethernet"
f. IEEE 802.3.af - "Data Terminal Equipment (DTE) Power via Media Dependent Interface (MDI) that"
g. IEEE 802.11.b/g/n/ac - "Wireless Transmission Standard"
h. IEEE 802.11.af - "Power over Ethernet"

5. American Society of Mechanical Engineers (ASME 17.1) – Safety Code for Elevators and Escalators
6. TSA - Checkpoint Design Guide (CDG) V6.1
7. TSA - Innovation and Concept Supplemental Information V1.0

1.4 SYSTEMS DESCRIPTIONS

A. At the minimum, the scopes of work covered by the Division 28 specifications and the contract drawings shall include but are not limited to the following systems. Refer to related drawings and specifications for additional information.

1. The Division 28 integrator shall be responsible for providing the proper design, installation, termination, programming, testing, commissioning, certification, modifications of all security systems. Include the integration of all related Division 28 systems in accordance with the Contract documents. Refer to all related project drawings and specifications for additional information.

B. The Contractor shall design, install, program and certify all Access Control System (ACS), servers, central processors, local door controllers, auxiliary power supplies, card readers, client workstations, electrical power, and all appurtenances in accordance with all applicable codes, manufacturers' requirements, project drawings and specifications.

1. At the minimum include the following;

a. Provide all related servers, central processors, local door controllers, components, cabling, conduits, materials, electrical power, programming, testing, certifications and all appurtenances as required for the installation of a complete and fully operational Access Control System (ACS). The ESSI shall provide all of the above in accordance with all applicable life safety codes, building codes, as well as all related specification sections, drawings and manufacturers recommendations.
b. All Access Control controls and devices, cabling as well as all remote sub-systems and/or control panels shall be supervised against unauthorized access, intentional or accidental tampering, deterioration of wiring or connections and operation failures. Any of the above conditions shall result in an audible and visual indication at all client workstations, network command terminals and UL listed communications equipment.
c. Provide all necessary 120 VAC circuits as required to provide proper operation of all system components. All 120 VAC circuits shall be provided from the nearest emergency circuit distribution panel.
d. The ESSI shall include the integration and programming of all electronic door hardware, fire alarm, video surveillance, network connectivity, in accordance with all applicable codes, manufacturers' requirements, project drawings and specifications.

e. The ESSI shall include the integration and wire of all electronic door hardware, in accordance with all applicable codes, manufacturers' requirements, project drawings and specifications. Coordinate with Division 08 provider.
f. Furnish and install duress buttons where located on the Contract Drawings
g. All PACS cabling shall be installed in dedicated raceways unless otherwise specified. All TCP/IP based access control system cabling shall be Category-6 installed in accordance with all requirements of related specification section 27 0 500 and related Division 27 specification section.

C. The Contractor shall design, install, program and certify all Video Surveillance System (VSS) servers, recording components, cameras, video monitors, power supplies, active electronic (Layer 2 Layer 3 switches) UPS Units, electrical power and all appurtenances in accordance with all applicable codes, manufacturers' requirements, project drawings and specifications.

1. At the minimum include the following;

a. Provide all related devices, components, cabling, conduits, materials, programming, testing, certifications and all appurtenances as well as all emergency power as required for complete and fully operational TCP/IP based Video Surveillance and Exit Breach System. The ESSI shall provide all of the above in accordance with all applicable electrical codes, communication standards, building codes, related specification sections, drawings and manufacturers recommendations.
b. Provide all necessary 120 VAC circuits as required to provide proper operation of all system components. All 120 VAC circuits shall be provided from the nearest emergency circuit distribution panel.
c. The ESSI shall include the monitoring of all access-controlled doors and duress button locations in accordance with all applicable codes, manufacturers' requirements, project drawings and specifications.
d. Provide all documentation, testing, commissioning and certifications in accordance with all requirements of the Contract Documents.
h. All VSS Cabling shall be installed in dedicated raceways unless otherwise specified. All TCP/IP based access control system cabling shall be Category-6 installed in accordance with all requirements of related specification section 27 05 00 and related Division 27 specification section.

D. The Contractor shall design, install, program and certify all Fire Alarm controls, processing components, initiating devices, notification appliances, annunciators, power supplies, electrical power and all appurtenances in accordance with all applicable codes, manufacturers' requirements, project drawings and specifications.

1. At the minimum include the following;

a. Provide all related devices, components, cabling, conduits, materials, programming, testing, certifications and all appurtenances as well as all emergency power as required for complete and fully operational fire alarm system. The ESSI shall provide all of the above in accordance with all applicable electrical codes, building codes, related specification sections, drawings and manufacturers recommendations.
b. Provide all necessary 120 VAC circuits as required to provide proper operation of all system components. All 120 VAC circuits shall be provided from the nearest emergency circuit distribution panel.

c. The ESSI shall include the integration and programming of all electronic door hardware, in accordance with all applicable codes, manufacturers' requirements, project drawings and specifications.
d. Provide all documentation, testing, commissioning and certifications in accordance with all requirements of the Contract Documents.
e. Refer to all related specification sections for additional system requirements.

1.5 SUBMITTALS

A. In addition to all submittal requirements as stipulated by Division 01 and any related specifications sections, the Contractor shall provide all shop drawing submittals in accordance with the following:

1. The Owner and OAR approvals shall be obtained for all equipment and material before delivery to the job site. Delivery, storage, or installation of equipment or material which has not had prior approval will not be permitted at the job site.
2. All submittals shall include adequate descriptive literature, catalog cuts, shop drawings, and other data necessary for the Owner and OAR to ascertain that the proposed equipment and materials comply with specification requirements. Catalog cuts submitted for approval shall be legible and clearly identify equipment being submitted.
3. Prior to any submission the contractor shall be responsible for performing the following quality control items to ensure compliance with all project requirements:

   a. Review all Shop Drawings and Product Data
   b. Review all field measurement criteria.
   c. Review all field construction criteria and methodologies.
   d. Review all catalog numbers and similar data.
   e. Review all coordination requirements of affected trades.
   f. Review conformance to all appropriate specification sections.

4. The ESSI shall have a registered RCDD professional review and seal shop drawings related to network designs, installations, testing, certifications, and structured cabling layouts for communications systems confirming that the proposed network infrastructure is in conformance with all stipulated standards and requirements as herein specified. Failure to provide RCDD sealed shop drawings shall result in all shop drawings being returned for resubmission without any reviews taking place.
5. The Owner and/or OAR's review of the shop drawings and/or samples does not relieve the Contractor from compliance with the requirements of the Contract documents. Unless the Contractor has informed the Owner and/or OAR in writing of such deviation at the time of submission, has noted the deviation on the shop drawings, has given written approval of the specific deviation to the project document, all project requirements shall stand. The Owner and/or OAR's review also does not relieve the Contractor from responsibility for any errors of omission in the submission of shop drawings and/or samples.

   a. All project requirements shall stand. The review and acceptance of shop drawings does not relieve the Contractor from responsibility for delivering the project in accordance with Contract documents due to errors of omission in the submission of shop drawings and/or samples.

6. Submit all system testing, commissioning and startup procedures to be employed. Include all estimated times for performance of all tests, all test equipment and manpower

necessary for testing.

7. Submit all integrator qualifications and certifications in accordance with the requirements as specified elsewhere in this specification section.
8. Submit project schedule outlining the time frames for all equipment with long lead times for equipment deliveries; include all system commissioning, testing, and training time expectations. Project schedule shall be submitted as CPM schedule and shall utilize a software-based project management program.

B. The Contractor shall schedule submittals in order to maintain the project schedule. For coordination requirements refer to Division 01 Specification Section, which outline basic submittal requirements and coordination. All Division 01 and related specification sections requirements shall be used in conjunction with all requirements as herein specified.

1. Submittals shall be provided as a complete submission; no partial submissions will be accepted. Failure to provide a complete submission shall result in all submittals being returned for resubmission.

   a. In addition to all paper submission requirements as stipulated by Division 01 the Contractor shall also submit one complete set of electronic submittals in a PDF format.

2. No substituted equipment shall be reviewed without prior approval in accordance with the requirements of "substitutions" under Division 1 specification section.
3. Mark the submittals, "SUBMITTED UNDER SECTION_____."

   a. Submittals shall be marked to show specification reference including the section and paragraph numbers.

C. All shop drawings shall be prepared using latest version of AutoCAD or REVIT, drawn accurately, and in accordance with the Owner's Standards. The Contractor shall not reproduce the Contract Documents or copy standard information as the basis of the technical data, hand drawn mark-ups of the original project drawings shall not be acceptable. Failure to provide a complete set of "contractor prepared" installation drawings at the time of submittal shall result in all submittals being returned for resubmission.

1. Submission Packaging: The Contractor shall organize the submissions according to the following packaging requirements.

   a. Electronic Copy Submission: One complete set of electronic equipment data sheets and drawings submitted in PDF format and collated in two distinct files:

      1) Equipment Data Sheets, equipment schedules, alarm matrixes cable termination spread sheets, and all related pertinent information.
      2) Drawings including all site plans, floor plans, risers, point to point wiring, grounding, installation details and mounting elevations.

   b. Hard Copy Submission: Submit hardcopies of all shop drawings and product datasheets in accordance with the requirements the of Division 01 specifications.

D. DELAYS:

1. Contractor is responsible for any delays in job progress accruing directly or indirectly from late submissions or resubmissions of shop drawings, or product data.

E. RE-SUBMITTALS:

1. Review of Contractor's submittals by the Owner's Authorized Representative (OAR) will be limited to examination of an initial submittal and one (1) resubmittal. The Owner and/or OAR reserves the right to obtain reimbursement from the Contractor for amounts paid to the OAR for evaluation of any additional resubmittals due to incomplete information or non-compliance to the project documents on the part of the Contractor. An incomplete submittal shall count as a submittal (either initial or a resubmitted as the case may be).

F. SHOP DRAWINGS:

1. All shop drawings (paragraph 1.1, E, 4.) shall include sufficient information, clearly presented, to determine full compliance with all project drawings and specifications. Include the following information for review; failure to provide all information listed below shall result in all shop drawing submittals being returned for resubmission:

   a. Include manufacturer's name(s), model numbers,
   b. All equipment /device electrical ratings and power requirements
   c. All equipment /device performance ratings.
   d. All conduit and cable size, type and routing
   e. All standby battery and wiring voltage drop calculations
   f. All equipment rack, panels and cabinet layouts, rack/cabinet sizes.
   g. All equipment and device-mounting elevations.
   h. All device wiring details.
   i. Complete point-to-point-wiring diagrams for all systems. Include all equipment and wiring termination schedules and/or matrixes.

2. Provide a complete set of "contractor prepared" installation drawings. Drawings at the minimum shall consist of all floor plans indicating all passive and active electronic component locations, field devices, device identifications, distribution racks, patch panels, control panels, auxiliary control panels, power supplies, conduits, cable trays, and cabling distribution, as well as all 120-volt electrical circuit locations and designations.

   a. CAD Drawings shall be made at 1/8" = 1'-0" scale. Drawings shall include at the minimum the following:

      1) Detailed equipment layouts for all communications rooms. Coordinate all room layouts with affected trades.
      2) Floor plan drawings showing locations of all equipment, devices, equipment cabinets and/or rack locations. Identify type and sizes of all equipment cabinets and/or racks.
      3) All cable tray layouts, and conduit routing of all conduits 2 inches in diameter or greater.
      4) All equipment rack layouts showing locations of all rack mounted equipment items.
      5) System riser diagrams and single line drawings, showing detailed connections for all parts of the system, including wire numbers, terminal block numbers and layouts, and other designations and codings (point-to-point wiring diagrams). System performance measurements shall be documented as specified.
      6) Equipment wattage for each location and estimated BTU production.
      7) Detailed equipment layouts for all equipment consoles. Indicate all

equipment locations, power connections, and installation details.

8) All equipment mounting hardware/brackets and installation details, identify type size, load capacities of all mounting hardware/brackets; include all mounting and installation details, all space requirements, any special architectural modifications required.
9) Outline drawings of all equipment cabinets/racks showing the relative position of all major components, all-wiring and grounding terminations. Include all panel, cabinet and/or rack dimensions.
10) Point-to-point wiring diagrams for all cabling. Include all cable drop identification at edge device and at termination equipment. Include complete wiring termination schedules.
11) All grounding and bonding termination points
12) All electrical circuit numbers and distribution panel locations.

3. All drawings shall be prepared using an AutoCAD- or REVIT-based program; hand drawn mark-ups of the original Contract Drawings shall not be acceptable. Failure to provide a complete set of "contractor-prepared" shop drawings at the time of submittal shall result in all submittals being returned for resubmission.

G. EQUIPMENT SUBMITTALS:

1. Sufficient information, clearly presented, shall be included to determine compliance with drawings and specifications.

   a. Include all equipment data sheets pertinent to equipment provided. All data sheets shall be highlighted indicating specific equipment model number, options and accessories supplied. Failure to provide the proper annotation of <u>all</u> equipment shall result in submittals being returned for resubmission.

2. Submit complete technical data necessary to evaluate the material and equipment. Include a complete technical specification for the submitted equipment, noting differences and adherence to this Section. Failure to provide the required data will result in all submittals being returned for resubmission.
3. Submit performance data, equipment ratings, cable requirements, control sequences, copies of all preliminary GUI screens (graphic maps), programming matrixes, logic diagrams and all other descriptive data necessary to describe the installation and operations of the systems being provided. Failure to provide the required data will result in all submittals being returned for resubmission.

H. MANUALS:

1. Submit simultaneously with the shop drawings, one complete operating and maintenance manual for the Owner and OAR reference. The manual shall include all operational programming and maintenance information for the system being provided; edit all manuals specific to the installation of the provided system and include all manufacturer's technical data sheets, programming matrixes and graphic screen representations.

   a. Provide a clear and concise <u>sequence of operation</u> that gives, in detail, the information required to properly operate all equipment and systems. Include detailed programming matrixes, indicating at the minimum all manual and automatic functions for all systems, components and devices comprising the system being provided.

b. Provide a complete lesson plan outlining the allocated time, methods and training procedures to be employed for training of the Owner's personnel in all functions, features and programming of the systems provided. Include number of training manuals, visual aids and training videos that will be utilized during the course of this training.

1.6 QUALITY ASSURANCE:

A. Installation, final cable termination, programming, start-up testing, certification and commissioning of all systems, system components, equipment and/or devices shall be under the direct supervision of the appropriate system integrator. This integrator shall be an accredited and authorized distributor of the equipment manufacturer for the equipment being provided and shall be capable of offering a service contract for system maintenance at completion of the project warranty period.

B. Qualifications for the Contractor: Documented successful work experience of at least three (3) facilities of equivalent size and technical requirements utilizing the technology proposed.

1. For each facility, list:

a. Name and location of facility.
b. Date of Occupancy by Using Agency.
c. Using Agency's representative to contact and telephone number.
d. Construction Manager or General Contractor.
e. Architect or Engineer.
f. Provide information on the installed locations with operational equipment.

C. Qualifications for System Integrators: Documented successful work experience of at least three (3) facilities of equivalent size and technical requirements utilizing the equipment proposed to be used.

1. For each facility, list:

a. Name and location of facility.
b. Date of Occupancy by Using Agency.
c. Using Agency's representative to contact and telephone number.
d. Construction Manager or General Contractor.
e. Architect or Engineer.
f. Provide information on the installed locations with operational equipment.

D. Each System Integrator shall have no less than 3 years of documented work experience on projects of equivalent size and similar scope, utilizing products provided by that contractor.

1. "Experience" is defined as the completion of the specific system being provided, with that system being successfully operated by the Using Agency for its intended purpose for at least one year.
2. In addition to the above, "Experience" shall also be defined as the completion of modifications and renovations to any associated system being provided in any existing occupied facility of this size and magnitude.

a. NOTE: The installation, programming, commissioning and testing of the fire alarm system shall be under the direct supervision of a current NICET Level IV fire alarm specialist who shall be knowledgeable in the following technical applications:

1) The Routing and installation of shielded, unshielded, twisted pair, coaxial and fiber optic cables.
2) Bonding and grounding of cabling, device, and equipment racks.
3) Fusion splicing of fiber optic cabling.
4) Testing copper conductors for electrical continuity.
5) Termination, connection, and testing of shielded and un-shielded twisted pair cable, coaxial cabling and fiber optic cabling on all specified connectors, electrical protection blocks, termination blocks and patch panels.
6) Generally accepted industry standards, NFPA 72 as well as manufacturers written installation instructions, will be used for in-process quality control and final acceptance of the work installation.

b. The Contractor shall provide registration number and expiration date of NICET level III installer assigned to the project.

E. All system integrators shall be (where required by jurisdiction) properly licensed by the governing municipality to provide the services and work of the specific system being provided. In addition, all system integrators shall be capable of providing full service for the entire warranty period within a 2-hour response time upon notification of a service emergency.

F. Pre-performance Conferences: Include provisions to attend all pre-performance conferences at Project site in compliance with all requirements in Division 01 "Project Meetings." Review methods and procedures related to installation and operations of all safety and security systems, including, but not limited to, the following:

1. Inspect and discuss electrical and control system roughing-in related to all safety and security systems as well as other preparatory work required to be performed by other trades.
2. Review sequence of operations for each type of system, controls and/or integration to any systems and/or equipment provided by other trades
3. Review and finalize construction schedule and verify availability of materials, installation personnel, equipment, and any preparatory work by other trades needed to make progress and avoid delays.
4. Review required start-up, testing, commissioning and certifying procedures to be employed for each system and any impacts to other trades.

G. Each equipment manufacturer shall be an ISO 9001 certified company and meet the requirements of BS EN9001: ANSI/ASQC Q9001-1994.

H. All security equipment and components must have transient protection in compliance with all NEC, IEEE 472 and UL 365 requirements. Where any circuits leave the building, additional transient protection must be provided for each circuit. Devices must be UL listed under standard #497B (Isolated Loop Protectors).

1.7 DELIVERY, STORAGE AND HANDLING

A. Protect all materials, equipment, devices or components permanently installed and/or stored on the job site. Protect all materials, equipment, devices or components during construction and after installation, provide protection of equipment until time of substantial completion.

1. Any materials, equipment, devices or components, stored on site which have been deemed by the Owner and OAR to exhibit any indications of damage or exposure dust or moisture shall not be installed and shall require in the immediate replacement at the contractor's expense.

2. Provide and apply appropriate protective material immediately upon receiving all materials, equipment, devices or components and maintain protection throughout the construction process.
3. Keep all materials, equipment, devices or components clean and dry, elevating equipment above ground and floor.
4. Take precautions to protect materials, equipment, devices or components from damage due to painting, fire proofing or other construction related debris.

1.8 RECORD DOCUMENTS

A. In addition to all requirements of Division 01 and related Division 28 specification sections, provide complete detailed, as-built drawings depicting the completed installation of all systems.

1. Drawings shall at the minimum include but not limited to:

a. All control equipment locations
b. All field devices
c. All junction and pull box locations.
d. All Equipment cabinet layouts and component locations.
e. All point to point wiring diagrams.
f. All conduit routing and sizes.
g. All system riser diagrams depicting the logical and functional relationship of all components, devices, equipment and controls.
h. All system performance data, equipment ratings and voltage requirements.
i. All control sequences, programming matrixes, flow diagrams and all other descriptive data necessary to describe the overall system operation and performance.

2. All as-built documentation shall be provided to the Owner and OAR for review prior to turn over to Owner. As-built documents shall be submitted in both paper and electronic media formats in the quantities as specified by Division 01 requirements.

a. All electronic drawings shall be prepared and submitted utilizing an AutoCAD- or REVIT-based program as manufactured by Autodesk. Where electronic documents are prepared using other than an AutoCAD or REVIT program manufactured by Autodesk, the contractor shall provide to the Owner the necessary software to electronically view the submitted documents.
b. All electronic data sheets, control sequences, programming matrixes and other descriptive data shall be provided in PDF formatted documents.

3. All junction boxes containing any system splices shall be uniquely identified in the field and indicated on the as-built drawings with corresponding schedule identifying all related splices at the specific junction box locations.

1.9 OPERATION AND MAINTENANCE

A. Provide complete set of operating and maintenance manuals in accordance with all requirements of Division 01 and related Division 28 specification sections. The manual shall include all operational programming and maintenance information for the system being provided, edit all manuals specific to the installation of the provided system and include all,

manufacturer's technical data sheets, programming matrixes and graphic screen representations.

1. Provide a clear and concise sequence of operation that gives, in detail, the information required to properly operate all equipment and systems. Include detailed programming matrixes, indicating at the minimum all manual and automatic functions for all system, components, and devices comprising the system being provided.

B. Include all As-built drawing documentation of all systems. Drawings shall reflect all requirements of paragraphs 1.5 and 1.8 of this specification section. Provide a clear and concise sequence of operation that gives, in detail, the information required to properly operate all equipment and system controls.

1.10 SOFTWARE AGREEMENT

A. Included as part of the scope of work for this project the Owner shall retain ALL Ownership and access rights of all system programs and software associated with all systems installed and/or modified as part of this project.

1. The contractor shall provide to Owner complete copies of all current software programming and software licenses related to the operation of each system prior to final acceptance of the related Contract scopes of work.

a. All programming shall include but not be limited to all device identifications, device descriptions, Programming Logic Matrixes, all program access level passwords as well as all function and sub-function routines.

2. Programming and software copies shall be provided to Owner DVD or Flash Drive digital formatted media. In addition, the contractor shall provide a complete hard copy printout of all system programming and shall be included as part of closeout documentation for review by the Owner and OAR.

B. Upgrade Software Service: Included in the cost of this project shall be an automatic software upgrade policy, which shall maintain all software to latest version on all new and existing system components installed and or modified as part of this project. This upgrade policy shall require the contractor to install, test and certify all software upgrades that become available from manufacturer for a period of one year from date of final acceptance.

1. Upgrading of software shall include all revised/new software, labor, testing certification as well as all licenses, software and all programming copies as described in paragraph 1.11, A, of this section for the installation any new and/or revised software.
2. Provide not less than thirty days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary.

1.11 EXTRA MATERIALS

A. Refer to related specification section "Extra Material" for specific requirements.

1. All Extra materials shall be provided at the time of final acceptance of the project and a signed packing list shall be obtained at the time of delivery.
2. At no time is the contractor to use the extra materials provided for this project to replace malfunctioning or damaged equipment and or components prior to final acceptance.

PART 2 – PRODUCTS

A. Materials and equipment furnished shall be of current production by manufacturers regularly engaged in the manufacture of such items, that meet and/or exceed the specified performance and features of the equipment and/or systems and for which replacement parts shall be readily available to the system integrator and/or using agency.

1. When more than one unit, device, or component of the same class of equipment is required, such units, devices, or components shall be the product of a single manufacturer.
2. Acceptable manufacturers for each system shall be as specified and shall be provided in full compliance with the requirements of this and all related specification sections and contract drawings.

   a. Manufacturers listed as acceptable shall not negate the contractors' responsibility for providing all equipment, devices, components, and/or systems, in accordance with all functions and performance requirements of the Contract Documents.
   b. Where manufacturer and/or manufacturer model numbers reference specific system components in the related specification sections, it is to establish the performance requirements and quality of the systems and components only.

      1) It is in no way an inference that the referenced model numbers are the manufacturer's current product and are the only acceptable components for this project unless specifically referenced as "no substitutions."

   c. The Contractor shall provide the manufacturers' most current product that shall meet and/or exceed the specified performance and features of the equipment and/or systems.
   d. Equivalent UL- listed equipment may be substituted for the approved manufacturers unless stipulated by other specification sections as "No Substitutions." All substitutions shall be submitted for approval by the Owner and OAR in accordance with all requirements of Division 01 specification sections and Chapter 1.4 "Submittals" chapter of this specification section.

      1) Where systems and/or components are referenced as "no substitutions" the specific system and/or components shall be provided.
      2) All substitutions shall comply with all requirements as specified above and all system performance standards shall be maintained.
      3) The contractor shall stipulate the following information impacted by such a substitution.

         a) Any and all extensions in time impacted by the substitution.
         b) Any changes to the architectural or structural elements to the project
         c) Differences in operation and/or performance from intended system criteria.

      4) Failure to provide the required substitution information shall result in "without consideration" the immediate rejection of the substituted equipment and/or systems.

B. Equipment Assemblies and Components:

1. Components of an assembled unit need not be products of the same manufacturer.

   a. Manufacturers of equipment assemblies, which include components made by others, shall assume complete responsibility for the final assembled unit.

b. Components shall be compatible with each other and with the total assembly for the intended service.
c. Constituent parts which are similar shall be the product of a single manufacturer.
d. Factory wiring shall be identified on the equipment being furnished and on all wiring diagrams.

C. Compatibility and Interoperability of System Components and Devices

1. Where multiple components, devices, and/or systems are intended to be interconnected and components of a complete system in accordance with any related specification sections, it shall be the Contractor's responsibility to verify interoperability and compatibility of said components, devices, and/or systems in full conformance to the specified performance criteria prior to the submission of shop drawings.
2. Where specified devices are found to be incompatible or incapable of performing as specified in a seamless manner, the contractor shall notify the Owner and OAR in writing prior to submission of shop drawings. Failure to properly identify such functional discrepancies shall not relieve the contractor from providing a complete and fully functional system in accordance with the requirements of all related specification sections.

D. Where Factory or Off-Premises Testing of any equipment, product or assembly is recommended by the product manufacturer or where specified as part of this section and/or any related specification section:

1. The Owner and OAR, shall have the option of witnessing all factory tests. The Contractor shall notify the Owner and OAR at a minimum of thirty (30) working days prior to the performance of any factory or off-premises tests.

a. Where the factory or assembly point for all off-premises testing is not within two (2) hours driving time from the project location, the system integrator shall include as part of this project all per diem costs (travel, meals and lodging) for a minimum of two representatives from the Owner and OAR to witness all testing.

2. Provide four (4) copies of certified test reports containing all preliminary test data and testing procedures shall be furnished to the Owner and OAR prior to any final testing and not more than ninety (90) days after completion of any tests.
3. When equipment, product, or assembly fails to meet any factory or off-premises tests, retesting of equipment, product, or assembly shall be mandated, the manufacturer/integrator shall be liable for all additional expenses, including all expenses incurred by the Owner and OAR for witnessing the retesting of any equipment, product, or assembly.

PART 3 – EXECUTION

3.1 COORDINATION

A. Coordinate with all trades at the time of shop drawing submission detailing all space and/or room conditions. The contractor shall coordinate with the appropriate trade all conditions impacting the installation of any system including but not limited to all equipment locations, ceilings, lighting fixtures, fire protection piping and ductwork layouts to the satisfaction of all concerned trades, subject to final review by the Owner and OAR.

1. Coordinate exact location of all desktop/counter mounted equipment with the Owner, OAR and affected trades prior to the installation of any equipment and/or cabling.

2. Coordinate exact location(s) of all ceiling mounted cable, conduits, equipment and/or devices with all architectural plans, reflected ceiling plans and affected trades prior to installation.
3. Equipment installations requiring coordination with other trades the contractor shall provide all templates, backboxes and equipment anchor bolts for mounting or flush mounting preparation, (e.g. pedestals or other devices requiring mounting on walls, concrete pads or other materials). Coordinate delivery of templates and equipment anchor bolts to preclude any delay in the construction schedule or the work of the affected trade.
4. If installation of equipment, raceways, cable trays, J-hooks and/or conduit is performed prior to coordination with other trades, which interferes with work of other trades or operation and maintenance of the facility, make necessary changes to correct the condition at no additional cost to the Owner.

B. Prior to final programming of all systems review with the Owner and OAR all system features, functions, system operations and related operational programming for all systems provided.

C. Provide coordination with all system integrators and trades for the proper installation of all equipment, components and all integration requirements in order to provide fully operational systems in accordance with all applicable specification sections.

D. Each Contractor shall maintain a complete set of current and up to date shop drawings and equipment submissions <u>at the job site at all times</u>. Shop drawings and all other submissions shall be made available to the Owner and OAR upon request.

3.2 EQUIPMENT PROTECTION

A. Protect all materials, equipment, devices, or components permanently installed and/or stored on the job site. Protect all materials, equipment, cabling, devices, or components during construction and after installation. Provide appropriate protection of all materials, equipment, components, and/or devices until time of substantial completion. All materials, equipment, components and/or devices shall be protected during shipment and storage against any physical damage, dirt, moisture, cold, snow, wind or rain:

1. During installation, enclosures, racks/cabinets, equipment, controls, controllers, circuit protective devices, and other like items, shall be protected against entry of any foreign matter; and shall be vacuum cleaned both inside and outside before testing and operating and repainting if required.
2. Any materials, equipment, components and/or devices, stored on site, which have been deemed by the Owner and OAR to exhibit any indications of damage or exposure dust or moisture shall not be installed and shall returned to the source of supply for immediate replacement.

   a. The use of spare parts or the return of defective equipment for repair to mitigate the damage of defective materials, equipment, components, and/or devices shall not be acceptable. All materials, equipment, components, and/or devices shall be new and unused until final acceptance by the Owner and OAR.

3. Provide and apply protective material immediately upon receiving the products and maintain throughout the construction process.

   a. Painted surfaces shall be protected with factory installed removable heavy kraft paper, sheet vinyl or equal.
   b. Any damaged paint on equipment and materials shall be refinished with the same

quality of paint and workmanship as used by the manufacturer so repaired area is not obvious or detectable.

4. Failure to properly protect all materials, equipment, components and/or devices prior to final acceptance shall constitute sufficient cause for rejection of materials, equipment, components and/or devices should any defects, damage or degradation in performance is observed.

B. Seismic Performance: The Contractor shall furnish and install all equipment bracing, and anchoring rated for the seismic zone of the geographical area in which the project resides, and shall withstand the effects of earthquake motion and wind forces in accordance with the current editions of the IBC and ASCE/SEI 7. Refer to Refer to Division 01 and Division 26 – Hangers and Supports for additional seismic information and requirements.

1. Equipment shall include, but not be limited to, racks/cabinets, video monitors, TV's, cable trays, conduits, junction boxes, and all associated appurtenances.

C. Immediately replace all malfunctioning materials, equipment, components, and/or devices with new unused products up until the time the Owner and OAR issues final acceptance of the system. The returning of any malfunctioning equipment, devices, and/or components to the manufacturer for repair and then reinstallation at the project site shall not be acceptable.

1. All replacement materials, equipment, components, and/or devices shall be factory new and not obtained from the Project's spare parts inventory or use factory recycled products unless expressly identified by contractor prior to replacement and approved beforehand by the Owner and OAR.

D. Ensure that safe access and egress from all work areas is maintained during movement and installation of materials.

E. Clean up all debris generated by installation activities. Keep all telecommunications, server and/or security electronic rooms free of debris at all times.

3.3 WORK PERFORMANCE

A. Installation, final termination, testing, start-up and commissioning of all systems, system components and cabling infrastructures shall be under the direct supervision of the appropriate system integrator. The integrator shall be an accredited and authorized distributor of the appropriate equipment manufacturer and shall be fully certified in the installation, testing, commissioning, and programming of all equipment, devices, components, and/or systems being provided as part of this project.

B. Job site safety and worker safety is the responsibility of the Contractor. Ensure that safe access and egress from all work areas is maintained during movement and installation of materials. Clean up all debris generated by installation activities. Keep all communications equipment rooms free of debris at all times.

C. Pre-installation Conferences: Include provisions to attend all pre- installation conferences at Project site in compliance with all requirements in Division 01 specification section and as herein specified. Review methods and procedures related to installation and operations of all communications systems, including, but not limited to, the following:

1. Inspect and discuss electrical and equipment roughing-in related to all communications systems as well as other preparatory work required to be performed by other trades.
2. Review and discuss all work, equipment deliveries, installation procedures, and related scopes as required to conform to the phased construction schedule.

3. Review sequence of operations for each type of system, control, cabling and/or integration to any systems and/or equipment provided by other trades
4. Review and finalize construction schedule and verify availability of materials, installation personnel, equipment, and any preparatory work by other trades needed to make progress and avoid delays.
5. Review required start-up, testing, commissioning, and certifying procedures to be employed for each system and any impacts to other trades.

D. For work on existing facilities, arrange, phase, and perform work to assure the operation of all communications systems for other buildings and contiguous spaces at all times. Refer to Division 01 specification section for additional information.

E. All new work shall be installed and connected to existing work neatly and carefully. Disturbed or damaged work shall be replaced or repaired to its prior conditions, as required by Division 01 specification sections.

F. Coordinate the installation of all cabling, conduits/raceways and cable trays and equipment with applicable trades to ensure proper operation and function of all integrated systems in accordance with all related specification sections. Refer to Division 01 specification section for additional project coordination requirements.

1. Coordinate with all trades at the time of shop drawing submission detailing all space and/or room conditions. The contractor shall coordinate with the appropriate trade all conditions impacting the installation of any system, conduit, or cable tray including but not limited to all equipment locations, site conditions, ceilings, lighting fixtures, fire protection piping, and ductwork layouts to the satisfaction of all concerned trades, subject to final review by the Owner and OAR.

   a. Coordinate exact location of all desktop/counter/wall mounted equipment with the Owner and OAR and all affected trades prior to the installation of any equipment and/or cabling.
   b. Coordinate exact location(s) of all cable, conduits, equipment and/or devices installations with all architectural plans, site plans, reflected ceiling plans and affected trades prior to installation.

      1) Equipment installations requiring coordination with other trades the contractor shall provide all templates, back- boxes and equipment anchor bolts for mounting or flush mounting preparation, (e.g. pedestals or other devices requiring mounting on walls, concrete pads or other materials). Coordinate delivery of templates and equipment anchor bolts to preclude any delay in the construction schedule or the work of the affected trade.

   c. If installation of equipment, devices, cabling, raceways, cable trays and/or conduit is performed prior to coordination with other trades, which interferes with work of other trades or operation and maintenance of the facility, make necessary changes to correct the condition at no additional cost to the Owner and OAR.
   d. Prior to the final programming of any systems review with the Owner and OAR all system features, functions, system operations, network mapping, system integrated responses and all related programming as required for the proper operation of the respective communications systems.

G. The Contractor shall maintain a complete set of current and up to date set of shop drawings and equipment submissions at the job site at all times. The Shop drawings and all other submissions shall be marked up to reflect all as-built conditions and shall be made available for review by the Owner and OAR upon request.

3.4 EQUIPMENT INSTALLATION

A. All system equipment installations shall be in accordance with good engineering practices, NEC, local building codes, and all manufacturer's requirements. Cable terminations at all equipment locations shall comply with all state and local electrical codes. All wiring shall test free from all grounds, shorts, stray voltages, and EMI.

B. Follow manufacturers' instructions for installing, components and adjusting all equipment and cabling. Submit two (2) copies of such instructions to the Owner and OAR before installing any equipment. Provide an additional copy of such instructions at the equipment during any work on the equipment. Where no instructions are included with the equipment, follow accepted industry practices and workmanlike installation standards.

C. Equipment location shall be as close as practical to locations as indicated on the contract drawings.

1. Provide all equipment clearances in accordance with NEC requirements. Arrange equipment to facilitate unrestricted access for maintenance and service around all equipment, components, and/or cable terminations.

D. Inaccessible Equipment:

1. Where the Owner and OAR determines that the Contractor has installed equipment not conveniently accessible for operation and maintenance, the equipment shall be removed and reinstalled as directed at no additional cost to the project.

a. "Conveniently accessible" is defined as being capable of being reached without the use of ladders, or without climbing or crawling under or over obstacles such as, but not limited to, motors, pumps, belt guards, transformers, piping, ductwork, conduit and raceways.

3.5 CABLE INSTALLATION

A. All system wiring and equipment installations shall be in accordance with good engineering practices and by all IEEE, EIA, NEC and manufacturer's requirements. All wiring shall comply with all state and local electrical codes.

1. Prior to the start-up and commissioning of any component, device, equipment and/or system, the contractor shall test and document that all cabling contains no grounds, shorts, sneak currents, RFI and EMI conditions.
2. Any video, security and communications cable running parallel to electrical cables not installed in conduits shall be separated by a minimum of 12" inches.
3. Any video, security and communications cable cables which must cross-high voltage electrical cables or conduits shall do so at 90-degree angles.
4. Do not leave any system cabling unprotected on the floor at any time. If cables must be left on any floor, protect the cables so that they may not be walked on or have any material or equipment placed or rolled on top. Replace all damaged cables from demarcation to termination point; no splicing of damaged cables shall be permitted.
5. Maintain manufacturer's recommended minimum bend radius of the cables at all times. Do not stretch, stress, tightly coil, bend or crimp the workstation cables when leaving them out of the way of other trades during the staging of the work. The contractor at the contractor's expense will replace all severely stressed cables.

B. All access control system cabling is to be concealed above ceilings and installed in "dedicated" conduits. All conduits shall be supported above ceilings to the building structure and shall not contain any AC carrying conductors or non-associated system cables.

1. Provide all access control cabling in accordance with all manufacturers' requirements.

a. All security conductors shall be twisted pair, minimum 16 AWG unless otherwise required by code, equipment manufacturer and/or noted elsewhere. Refer to related specification sections for additional information.
b. Twisted pair, minimum 14-gauge wire, shall be utilized for control of electrical and motorized doors and gates unless otherwise required by code, equipment manufacturer and/or noted elsewhere. Refer to related specification sections for additional information.

C. All Video surveillance system cabling is to be concealed above ceilings and installed in dedicated conduits. All conduits shall be supported above ceilings to the building structure and shall not contain any AC carrying conductors or non-associated system cables within the cable bundles. Provide all Video surveillance system cabling in accordance with all manufacturers' requirements, at the minimum all cabling shall conform to the following:

1. All cabling associated with the installation of the Video surveillance system shall utilize Category-6 UTP cables. Refer to related specification section 270500 and 271100 for additional information related to the proper installation of Category-6 UTP cables.
2. Any video surveillance system cabling installed exterior to the building and/or all cabling being routed from the facility to any remote location external to the project location shall be fiber optic cable. Refer to Division 27 specifications for additional information.
3. Coordinate all system cabling with system provider prior to shop drawing submission.

D. All fire alarm system cabling is to be concealed above ceilings and installed in "dedicated" conduits. All conduits shall be supported above ceilings to the building structure and shall not contain any AC carrying conductors or non-associated system cables.

1. Provide all fire alarm cabling in accordance with all manufacturers' requirements.

a. All initiating circuits shall be twisted shielded pair, minimum 16 AWG unless otherwise required by code, equipment manufacturer and/or noted elsewhere. Refer to related specification sections for additional information.
b. Twisted pair, minimum 14-gauge wire, shall be utilized for all notification appliance circuits as well as control of all HVAC equipment, Elevators, motorized doors and gates unless otherwise required by code, equipment manufacturer and/or noted elsewhere. Refer to related specification sections for additional information.

E. All Fiber optic cabling shall be provided in accordance with all manufacturers' recommendations for the proper operation of the connected systems and/or devices. Fiber optic cabling shall be configured as 8.3/125 single mode or 62.5/125 multimode fiber optic cable as indicated on the drawings. Provide number of fiber strands in hybrid cable in accordance with the contract drawings and/or specifications.

F. All fiber optic cabling shall be installed in dedicated conduits. Refer to related specification sections for additional information.

1. Fiber optic cabling shall be provided as the primary communications and control media for all exterior and remote building surveillance cameras, all network communications links for security and fire alarm systems in accordance with the Contract Documents. Each fiber optic link shall be comprised of dedicated transmitter and receiver shall be

capable of providing video/data/communication transmissions for a minimum of 1,280 feet. Refer to related specification sections for all additional Fiber optic-cabling requirements.

2. Conductive fiber optic cable shall be provided where shown on the contract drawings for all exterior system components requiring control and/or power capabilities in the support of their operation, include all necessary surge protection and grounding for conductive cabling.

G. All conduits/raceways shall be installed in a manner that prevents tampering or removal when installed in areas exposed to the general population.

1. Provide tamper-resistant installation utilizing "torx with peg" security-fastening devices for all conduits/raceways, equipment, devices and appurtenances in all areas accessible to the general population and/or areas subjected to tampering or vandalism.

H. Conduits/raceways shall be concealed and shall be installed above finished ceilings and/or in walls. Any conduits/raceways installed in areas requiring installation to be exposed, shall be installed tight to ceilings at right angles to walls and shall not obstruct any access hatches, equipment service panels, lighting or other equipment and/or devices.

1. Where conduits/raceways cannot be concealed above accessible ceilings or in walls or where installed in finished areas such as offices, occupied rooms, or other spaces were exposed conduits would impact the aesthetics of that space, all conduits shall be installed in finished metal wire-mold type raceways.
2. All conduits and locations shall be reviewed and accepted by the Owner and OAR prior to installation. No exposed cabling or EMT type conduits will be acceptable in any finished or occupied spaces of the facility without the prior approval by the Owner and OAR.
3. Where any equipment and/or junction boxes are installed above finished ceilings, the contractor shall provide access hatches listed for the intended application. Access hatches shall be located so that service access to the equipment and/or junction boxes is unimpeded.
4. Access hatches shall not obstruct any equipment, service panels, lighting equipment, devices or any architectural elements of the ceiling. At the time of submittals, the contractor shall submit all proposed access hatch locations for review by the Owner and OAR.

I. Interior raceways shall be a minimum 3/4 inches unless otherwise noted. Exterior raceways shall be a minimum 1-inch. Size all raceways and install conductors in accordance with NEC requirements. Conduit fill ratio shall not exceed 40 percent for all raceways.

1. EMT conduit with compression fittings and/or MC cabling may be utilized in all inaccessible ceiling areas unless otherwise restricted by code.
2. Threaded Rigid metal conduit shall be used on all exterior applications and all interior accessible areas where concealed conduit requirements cannot be met and are exposed to the general population as well as any areas that may be subject to tampering by the general population. Submit drawings, diagrams and information for review by the Owner and OAR at the time of shop drawing submissions for all exterior and exposed conduit installations.
3. Conduit expansion couplings shall be provided in all areas where expansion/contraction may occur to couple together two sections of a conduit run subject to longitudinal movement. The contractor shall refer to architectural drawings for exact locations of all building expansion joints. Conduit expansion couplings shall be consistent with the size

the conduit being installed, shall be steel electrogalvanized, and shall meet all environmental and seismic conditions.

a. Expansion couplings shall be weatherproof and approved for use indoors or outdoors without an external bonding jumper.
b. Expansion couplings shall be UL Listed and approved for use in wet locations.
c. Expansion couplings shall comply with UL 514B, CSA 22.2 No. 18 3-12, NEMA FB1.

4. PVC schedule 40 conduit shall be utilized in all underground applications. The conduit shall be buried at a minimum 36" below grade. Detectable warning tape shall be buried 12" below grade to indicate the conduit routing location. Rigid conduit (RGS) shall be utilized on all stub-ups.
5. The Contractor shall have the option to utilize the same trench/routing location as other utilities. In no case shall any system conduits or duct bank be combined with other electrical utilities. The contractor shall provide hand holes as required dedicated for each system cabling. Provide drainage to all underground hand holes. Splices in hand holes are unacceptable.
6. All raceways shall be supported in accordance with NEC requirements and shall be affixed in such a manner that tampering and/or removal by the general population without the use of specialized tools shall be prevented.
7. All wall/floor penetrations are to be sleeved and fire stopped with approved fire stopping material. Coordinate all cable and conduit penetrations of the structure with all trades. Refer to related Division 07 specification section for additional information.

J. Follow manufacturers' instructions for installing, components and adjusting all equipment and cabling. Submit two (2) copies of such instructions to the Owner and OAR before installing any equipment. Provide a copy of such instructions at the equipment during any work on the equipment. Where no instructions are included with the equipment, follow accepted industry practices and workmanlike installation standards.

K. Keep all items protected before and after installation, with dust and water proof barrier materials. It shall be the contractor's responsibility to ensure the integrity of these protective measures throughout the course of the project.

L. At all times during the construction, the Contractor shall protect all equipment and cabling from damage.

1. Ensure that safe access and egress from all work areas is maintained during movement and installation of materials.
2. Clean up all debris generated by installation activities. Keep all telecommunications and security electronic rooms free of debris at all times.
3. Deliver to the Owner two sets of all special tools specifically needed for proper operation, adjustment, and maintenance of cable and cable termination hardware installed under this Contract.
4. Upon project completion, test all cabling and provide all as-built drawings and documentation as defined herein and/or specified elsewhere

M. All trade personnel shall be qualified to perform the work activities and be knowledgeable of the following:

1. The Routing and installation of shielded, unshielded, twisted pair, coaxial and fiber optic cables.
2. Bonding and grounding of cable trays, conduits and equipment racks.

3. Fusion splicing of fiber optic cabling.
4. Testing conductors for electrical continuity.
5. Testing of all copper conductors for attenuation and worst case near end cross talk.
6. Testing conductor insulation.
7. Termination, connection, and testing of shielded and unshielded twisted pair cable, coaxial cabling and fiber optic cabling on all specified connectors, electrical protection blocks, termination blocks and patch panels.
8. Generally accepted industry standards, as well as manufacturers written installation instructions, will be used for in process quality control and final acceptance of the work installation.

N. Contractors shall have the option to combine all home runs and conductors of same type and voltage class in accordance with NEC requirements unless specified elsewhere. Size all conduits and install all conductors in accordance with NEC requirements and manufacturers recommendations.

1. Protect all cabling exiting the building against lightning-induced surges. All signaling, communications and data cables exiting the building shall have surge protection circuits installed at each end that meet the IEEE 472 surge withstand capability test and the electrical transient tests established in UL 365. Fuses shall not be used for surge protection.

O. Penetrations of Walls and Floors.

1. All penetrations of walls and floors shall be fire stopped in accordance with the ASTM and NFPA. Refer to Division 07 and related specification sections for additional information.
2. Floor penetrations shall be sleeved with a minimum sleeve diameter of 4 inches. An additional penetration shall be provided for future use, sleeved and capped and fire stopped as required.
3. Coordinate size of wall penetration with conduit size, number of conductors. Comply with all NEC requirements.
4. The fire rating of all penetrated walls, floors, and ceiling structures shall be strictly maintained. All penetrations shall be fire stopped and sealed by the Contractor.
5. Install fire-stopping in open penetrations and in the annular space of penetrations for fire rated barriers.
6. Installation of fire-stops shall be performed by an applicator/installer qualified and trained by the manufacturer. Installation shall be performed in strict accordance with manufacturer's detailed installation procedures.
7. Installation of all fire-stopping shall be in accordance with fire test reports, fire resistance requirements, acceptable sample installations, manufacturer's recommendations, local fire and building authorities, and applicable codes and shall be installed in a manner acceptable to the AHJ.

3.6 ELECTRICAL POWER DISTRIBUTION

A. All 120/208VAC emergency electrical power shall be provided by this Contractor from the nearest emergency distribution panel as required for the proper operation of all communications systems, devices and/or components.

1. Coordinate with the Division 26 contractor, Owner and OAR prior to connections and/or modifications to the electrical distribution panels. Additional locations requiring electrical power by the specific products and/or integrator selected equipment shall be the

responsibility of this Contractor to include as part of this project.

a. Primary power for all system controls, sub-control panels, processors, and power supplies shall be configured to switch to emergency backup power sources automatically when primary power is interrupted without degradation of any critical system functions.
b. All electrical power shall be hardwired to the panel. System components or panels employing the use of plug-in transformers, extension cords or cheater cords for the connection to electrical power shall not be acceptable.
c. If no spare 20A/1P circuits are available for use, the contractor shall provide a new subpanel adjacent to the existing panel. Remove (3) 20A/1P breakers and replace with a 60A/3P breaker to feed the subpanel.
d. Subpanel shall be 60A MLO with 18 circuits. Reconnect the (3) 20A/1P circuits to this new panel. Extend branch wiring as required. The Contractor shall size feeder to subpanel per the national electric code.

3.7 TRANSIENT VOLTAGE SUPPRESSION

A. Transient Voltage Surge Suppression: All cables and conductors extending beyond building façade, except nonconductive fiber optic cables, which serve as communications, control, or signaling circuits shall be protected against Transient Voltage surges and have Transient Voltage Surge Suppression (TVSS) protection.

1. The TVSS device shall be UL listed in accordance with Standard TIA 497B installed at each end. Lighting and surge suppression shall be a multi-strike variety and include a fault indicator.
2. Protection shall be furnished at the equipment and additional triple solid state surge protectors rated for the application on each wire line circuit shall be installed within 914.4 mm (3 ft) of the building cable entrance. Fuses shall not be acceptable for surge protection applications. All inputs and outputs shall be tested in both normal mode and common mode to verify there is no interference at the minimum surge suppression test shall meet the following criteria.

   a. All system power supplies serving exterior system components or devices shall be provided with the appropriate transient surge suppression protection on both the line side as well as the load side.

      1) A 10-microsecond rise time by 1000 microsecond pulse width waveform with a peak voltage of 1500 volts and a peak current of 60 amperes shall be the minimum performance requirements. Provide surge suppression in accordance with all manufacturer's requirements.
      2) An 8-microsecond rise time by 20-microsecond pulse width waveform with a peak voltage of 1000 volts and a peak current of 500 amperes shall be the minimum performance requirements. Provide surge suppression in accordance with all manufacturer's requirements.
      3) Maximum series current: 2 AMPS. Provide units manufactured by Advanced Protection Technologies, model # TE/FA 10B or TE/FA 20B or approved equal.
      4) Operating Temperature and Humidity: -40 to 85 degrees C (-40 to 185 degrees) shall be the minimum performance requirements. Provide surge suppression in accordance with all manufacturer's requirements.

3.8 GROUNDING AND BONDING

A. Refer to related electrical specification sections and drawings for any additional grounding and bonding requirements.

B. At the minimum all electronic equipment, conduits, cable trays, racks/cabinets control panels, and cable shields shall be properly grounded and bonded in accordance with all requirements of EIA/TIA 607-A, NEC 250 and IEEE 1100, and all related specification sections.

1. All electronic equipment, conduits, cable trays, racks/cabinets and cable shields shall be properly grounded and bonded in accordance with all requirements of EIA/TIA 607-A, NEC 250 and IEEE 1100. In addition, all system grounding shall conform to all grounding requirements of Motorola R56 Standards and Guidelines for Communications Sites if and where identified as applicable to this project.

   a. All grounding connections shall provide the equalization of all grounding potentials between the building power system and the grounding terminations at the equipment in order to provide the diversion of electrical transients as well as providing the necessary coupling in order to cancel and/or reduce any voltage transients.
   b. The minimum bonding connection shall be a #6 AWG copper conductor. All grounding shall provide an effective bonding connection between the protected equipment to the nearest approved building grounding electrode (structural steel) as well as to the local power distribution panel grounding system (e.g., ac branch circuit panel board's equipment grounding busbar). All bonding and grounding connections shall be NEMA type compression or exothermic welded connections.
   c. Equipment Grounding: Metallic structures, equipment racks, cabinets and enclosures as well as all raceways, cable trays, junction boxes, outlet boxes, machine frames, and other conductive items shall be bonded and grounded.
   d. Duct Banks and Manholes: Provide an insulated equipment grounding conductor in each duct containing any voltage conductors, sized per NEC except that minimum size shall be No. 2 AWG. Bond the equipment grounding conductors to the grounding bus, to all manhole hardware and ground rods, to the cable shielding grounding provisions for all cable splices, terminations and equipment enclosures.
   e. Metallic Fences equipped with communications equipment: Fences shall be grounded with a ground rod at each fixed gate post and at each corner post.

      1) Drive ground rods until the top is 300 mm (12 inches) below grade. Attach a No. 4 AWG copper conductor, by exothermic weld to the ground rods and extend underground to the immediate vicinity of fence post. Lace the conductor vertically into 300 mm (12 inches) of fence mesh and fasten by two approved bronze compression fittings, one to bond wire to post and the other to bond wire to fence.
      2) Each gate section shall be bonded to its gatepost by a 3 by 25 mm (1/8 by one inch) flexible braided copper strap and ground post clamps. Clamps shall be of the anti- electrolysis type.

1. All connections of grounding conductors to ground rods, bus bars, rebar, structural members, pipes and fences, as well as splices of any ground conductors, shall be made by exothermic welds except where otherwise noted. All connections to bar lugs shall be exothermic weld or compression type connections. Bolted type connection of ground conductors may only be made where terminal lugs or blocks have been furnished and installed in equipment by the manufacturer.

a. Equipment grounding conductors shall be insulated stranded copper, except for sizes No. 10 AWG and smaller shall be solid copper. Insulation color shall be continuous green for all equipment grounding conductors, except that wire sizes No. 4 AWG and larger shall be permitted to be identified per the NEC.

1) At the minimum bonding connection shall be a #6 AWG copper conductor. All grounding shall provide an effective bonding connection between the protected equipment to the nearest approved building grounding electrode (structural steel) as well as to the local power distribution panel grounding system (e.g., ac branch circuit panel board's equipment grounding busbar). All bonding and grounding connections shall be NEMA type compression or exothermic welded connections.

3.9 EQUIPMENT IDENTIFICATION

A. Identify all system controls, components and equipment cabinets using plastic laminate engraved ("lamicoid") labels or approved equal. Firmly affix to the panel, device, and/or component. Refer to all related specification sections for additional information.

1. Nameplates shall be laminated black phenolic resin with a white core with engraved lettering, a minimum of 6 mm (1/4 inch) high. Secure nameplates with screws. Nameplates that are furnished by manufacturer as a standard catalog item or where other method of identification is herein specified. Dymo or Kroy tape adhesive-backed lettering shall not be acceptable.
2. Color-code all junction boxes and enclosures per NEC recommendations. At the minimum provide all communications junction boxes as follows:

a. Color for Security circuits - Yellow.
b. Color for Fire Alarm circuits – Red
c. Letter all pull boxes and junction boxes located in service areas, tunnels, above accessible ceilings and pipe chases with laminated black phenolic resin with a white core with engraved lettering, a minimum of 6 mm (1/4 inch) high. Secure nameplates with screws.

1) Example: Security "SEC" Circuit Number SEC-126.
Engraved laminated plastic tags shall be used for identification and securely fastened in accordance with all project requirements.

3. Permanently label all cabling at both ends with self-adhering plastic labels.

a. Labeling: hand written labels are not acceptable. All labels shall be machine printed on clear or opaque tape, stenciled onto adhesive labels, or type written onto adhesive labels. The font shall be at least one-eighth inch (1/8") in height, block characters, and legible.

1) The text shall be of a color contrasting with the label such that it may be easily read. If labeling tape is utilized, the width of the tape shall not exceed 3/8," and the font color shall contrast with the background.
2) All data patch panels shall exhibit data drop numbers, in sequential order, for all workstations served by the associated network equipment.
3) Each fiber optic cable segment shall be labeled at each end with its respective communications network identifier.
4) Warning Tags: At each location where the fiber cable is exposed to human

intrusion, it shall be marked with warning tags. These tags shall be yellow or orange in color and shall contain the warning: "CAUTION FIBER OPTIC CABLE." The text shall be permanent, black, block characters, and at least 3/16" high.

(a) A warning tag shall be permanently affixed to each exposed cable or bundle of cables, at intervals of not more than five (5) feet. Any section of exposed cable which is less than five (5) feet in length shall have at least one warning tag affixed to it.

4. Provide typewritten circuit directories installed in 3-ring binders with transparent page protectors in each control and sub control cabinet and/or equipment rack.

3.10 MAINTENANCE & SERVICE

A. Test and service the system on a quarterly basis during the warranty period.

1. For each quarterly maintenance period, provide written notification to the Owner of the systems condition before and after service, the exact components that were tested and serviced, and overall status of the system.

3.11 WARRANTY

A. Warrant material and workmanship for a period as specified in General Conditions and Division 01 of the Contract Documents and related specification sections. At the minimum the contractor shall provide warranty provisions:

1. Warrant the replacement of defective components/materials and/or correct defective work when given notice by the Owner and OAR during the warranty period.
2. Warranty excludes liability for consequential incidental, or special damages due to vandalism, misuse, or acts of God.
3. Onsite warranty response time by qualified technician shall be within 4 hours upon receipt of request from Owner.
4. Warranty repairs shall be provided to the Owner at no cost. This shall include but not limited to all repairs and/or replacement of defective components/materials, all labor charges, all travel costs and all vehicle charges.
5. Response time shall be 7 days a week / 24 hour a day / 365 days a year.
6. Contractor must provide verification that they maintain their principle base of operation along with the personnel that will be responsible for providing service within 4 hours driving time to the project site. This tenet of the warranty shall remain in effect for the life of the warranty.

3.12 FIELD SERVICES

A. In addition to all testing requirements as specified by Division 01 specification section and all related Division 28 specification sections, testing of all systems, sub-systems and cabling infrastructures shall be provided in accordance with all requirements of this section.

B. Notify the Owner and OAR in writing, prior to the closing of any ceilings and ten (10) days advance of testing all system cabling to prevent delays in construction schedules.

1. Test all cabling to confirm that no grounds, shorts, sneak currents, RFI and EMI conditions exist prior to start-up and commissioning of all, components, devices, equipment and/or systems.

a. Before requesting a final inspection, the contractor shall perform a series of end to end installation performance tests. The contractor shall submit for approval by the Owner and OAR all test procedures to be employed, test result forms, and timetable for testing all fiber optic and UTP structured copper wiring.
b. Acceptance of the simple test procedures discussed below is predicated on the contractor's use of the recommended products including but not limited to, fiber optic cable, category structured cable, cross-connect blocks, patch panels, and outlet devices specified and adherence to the inspection requirements and practices set forth. Acceptance of the completed installation will be evaluated in the context of each of these factors.

C. Acceptance of the simple test procedures discussed below is predicated on the contractor's use of the specified products including but not limited to, all Division 28 systems, sub-systems, system components, fiber optic cable, category structured cable, cross-connect blocks, patch panels, and outlet devices as specified by all related specification sections and installed in accordance the Contract documents, manufacturer's recommended practices and all applicable codes, standards and industry practices. Acceptance of the completed installation for each system will be evaluated in the context of each of these factors.

D. General

1. Phases of Testing:
2. Factory Acceptance Test (FAT) / Manufacturer's Proof of Concept Test (as applicable)
3. On-Site Performance Verification Testing
4. On-Site Endurance Testing
5. Test Plan/Procedure: The Contractor shall provide six (6) hardcopies and an electronic copy of the test plan/procedures for each testing phase for the review and approval of the Owner and OAR. The test plan for each phase shall detail the objectives of all tests. The tests shall clearly demonstrate that the system and its components fully comply with the requirements specified herein. The test plan shall be provided at least forty-five (45) days prior to the scheduled start of each test. Test plans shall contain at a minimum:

a. Functional procedures including use of any test equipment
b. Test equipment is to be identified by manufacturer and model
c. Interconnection of test equipment and steps of operation shall be defined
d. Test records shall include test equipment serial number, calibration date and calibration certification of test equipment
e. Expected results required to comply with specifications
f. Traceability matrix referencing specification requirements with specific test procedures
g. Record of test results with witness initials or signature and date performed
h. Pass or fail evaluation with comments.
i. The test procedures shall provide conformity to all specification requirements. Satisfactory completion of the test procedure is necessary as a condition of system acceptance.
j. The Contractor's Quality Assurance organization shall review all formal test procedures prepared by the Contractor and deliverable under the contract to assure the tests cover all requirements and that there is a conformity between the conducted test, the test results and specification requirements
k. Documentation verification, both interconnects and functionality shall be part of the test. Where documentation is not in accordance with the installed system interconnect and operating procedures, the system shall not be considered accepted until the system and documentation correlate.

l. All testing must be witnessed by the Owner and OAR. The Contractor shall cooperate fully in this regard.

m. Test Reports: The Contractor shall prepare, for each test, a test report document that shall certify successful completion of that test. Six (6) hardcopies and one electronic version of the test report shall be submitted to the Owner and OAR for review and acceptance within seven (7) days following each test. The test report shall contain, at a minimum:

1) Commentary on test results.
2) A listing and discussion of all discrepancies between expected and actual results and of all failures encountered during the test and their resolution.
3) Complete copy of test procedures and test data sheets with annotations showing dates, times, initials, and any other annotations entered during execution of the test.
4) Signatures of persons who performed and witnessed the test.

6. Test Resolution: Any discrepancies or problems discovered during these tests shall be corrected by the Contractor at no cost to the Owner and OAR. The problems identified in each phase shall be corrected and the percentage of the entire system re-tested determined by the Owner and OAR, before any subsequent testing phase is performed.

B. Factory Acceptance Testing

1. Test Setup Equipment: Equipment shall be actual products or identical models of products to those designated to be delivered and installed at the site. The following equipment shall be setup and used for conducting pre-delivery test:

a. Operator equipment associated with system.
b. End devices and displays associated with system.
c. Software associated with system.
d. Administrative console equipment.
e. Sufficient signal transmission media (STM) and associated equipment and accessories to provide a fully integrated system model. Include at least one of each type STM circuit.
f. Number of field processors required for system to be installed at site.
g. Enough load and data simulators to provide simulation of full load operational conditions as required by design. Loads shall be manually, or software generated.

2. Preparation: Ensure that development of system is complete, required approvals of submittals have been obtained, and sufficient equipment procured to completely demonstrate and test system. Schedule pre-delivery test with Project Manager at least 45 days prior to test:
3. Time: Prior to delivery of any equipment to site. Conduct on weekdays during standard business working hours.
4. Location: Manufacturer's plant or other location approved by the Owner and OAR.
5. Items to be tested shall be set up and performance verified prior to arrival of the Owner and OAR at test site.
6. Test: The purpose is to test the complete computer software package and equipment of the system and demonstrate that all specified features and performance criteria are met. All requirements of the specification shall be tested including, but not limited to:

a. Functionality including reporting and response.
b. System capacity.

c. Hardware interaction.
d. Hardware and software interaction.
e. Demonstrate report generation.

7. Acceptance: Acceptance of system to perform sufficiently and provide specified functions shall be determined by the Owner and OAR witnessing the factory acceptance test. In addition to the Owner, testing shall be witnessed by up to two (2) additional Owners Authorized Representatives (OAR).

   a. Acceptance Criteria: Performance of system shall equal or exceed criteria stated in individual specification sections.
   b. If system does not perform satisfactorily, the Contractor shall make corrections and modifications and schedule new test with the Owner and OAR. Compliance is at the sole discretion of the Owner and OAR. If compliance cannot be met, or is insufficient, the Owner and OAR shall have the right to terminate the contract.

8. Completion:

   a. At successful completion of test, dismantle equipment so as to prevent damage. Replace all defective or worn items.
   b. Re-pack in original containers all equipment to be delivered to site for installation. Mark on containers that items were used in factory test.

9. Reporting:

   a. Record all test procedures and results.
   b. Submit report in accordance with reporting requirements in General Testing Requirements Section.

C. Performance Verification Testing

1. Complete operational testing of all components and systems shall be witnessed by the Owner and/or OAR.
2. Schedule test with the Owner and OAR. Do not begin testing until:

   a. All systems have been installed and individually and jointly tested to ensure they are operating properly.
   b. Written permission from the Owner and OAR has been received.

3. Testing: As part of performance verification, test all components of system. The tests shall demonstrate system features.
4. Verification: Verify correct operation of the required system functionality as defined in these specifications.
5. Adjustment, Correction, and Completion:

   a. Correct deficiencies and retest affected components.
   b. Make necessary adjustments and modification to system after obtaining approval of the Owner or authorized representative.
   c. Completion: Performance verification test shall be complete when testing or retesting of each component has produced a positive result and has been approved in writing by the Owner or authorized representative.

6. Recording:

   a. Describe actual operational tests performed and equipment used and list personnel performing tests.
   b. Record in tabular form all test results, deficiencies, and corrective measures.

7. Termination

   a. Performance verification test shall be terminated by the Owner and OAR when:

      1) Individual systems, system components, subsystems, or cabling infrastructure fail to perform as specified.
      2) It is determined that a system or sub-system is missing any components or installation is not complete.

   b. Upon termination, corrective work shall be performed, and performance verification test rescheduled with the Owner and OAR.
   c. Retesting shall be performed by Contractor at no additional expense.
   d. Contractor shall continue to perform corrective actions and retest until system passes all tests to satisfaction of the Owner and OAR.

D. Endurance Testing

1. Provide personnel to monitor the system operation 24 hours per day, including weekends and holidays during endurance testing.
2. Start test after:

   a. Successful completion of performance verification testing.
   b. Training as specified has been completed.
   c. Correction of deficiencies has been completed.
   d. Receipt of written start notification from the Owner and OAR.

3. Monitor all systems during endurance testing. Coordinate monitoring with the Owner and OAR.
4. Recording: Record data on approved forms so as to provide a continuous log of systems performance. Include:

   a. Date and time for all entries.
   b. Name of individual making entry.
   c. Environmental conditions.
   d. Owner activities in process.
   e. Description of all alarm annunciations, responses, corrective actions, and causes of alarms. Classify as to type of alarm.
   f. Description of all equipment failures, including software errors.
   g. Description of all maintenance and adjustment operations performed on system.
   h. Daily and weekly tabulations.
   i. Daily entries of performance data shall be reviewed by the Owner's representative designated to observe monitoring of system.

5. The Owner and OAR may terminate testing at any time when any system, sub-system, system component or cabling infrastructure fails to perform as specified. Upon termination of testing, the Contractor shall commence an assessment period.

E. Adjustment, Correction, and Maintenance

1. During endurance testing make adjustments and corrections to system only after obtaining written approval of the Owner or authorized representative.
2. During endurance testing, perform required maintenance on systems including provision of replacement parts.

F. Final Inspection and Acceptance

1. After endurance testing is complete, review tabulated records with the Owner and OAR.
2. The Contractor will not be responsible for failures caused by:
   a. Outage of main power in excess of backup power capability provided that automatic initiation of all backup sources was accomplished, and automatic shutdowns and restarts of systems performed as specified.
   b. Failure of any Owner furnished power, communications, and control circuits provided failure was not due to Contractor furnished equipment, installation, or software.
   c. Failure of existing Owner equipment provided failure was not due to Contractor furnished equipment, installation, or software.
3. When performance of integrated system does not fall within the above rates, determine cause of deficiencies, correct, and retest.
   a. When requested by the Owner and OAR, extend monitoring period for a time as designated by the Owner or authorized representative.
   b. Submit final report of endurance testing containing all recorded data.
4. The Contractor shall submit written certification that:
   a. The Contract Documents have been reviewed.
   b. All required as-built documentation has been submitted and approved by the Owner and OAR.
   c. The Project had been inspected for compliance with the Contract Documents.
   d. The Work has been completed in accordance with the Contract Documents.
   e. The equipment and systems have been tested and are shown operational in the presence of the Owner and OAR.
   f. The Project is completed and is ready for final inspection.

3.13 TRAINING

A. General

1. By means of training classes augmented by individual instruction as necessary, the Contractor shall fully instruct the Owner's designated staff in the operation, adjustment and maintenance of all products, equipment and systems. The Contractor shall be required to provide all training aids, e.g., notebooks, manuals. The Contractor shall provide an appropriate training area equipped with all required equipment. The location of the training area shall be coordinated with the Owner.
2. All training shall be completed a minimum of two weeks prior to system cut over. Training schedule shall support the various work shifts of the Owner's personnel and shall be subject to the Owner and OAR approval.
3. Training shall be conducted by experienced and factory authorized personnel and supported by training aids. An adequate number and amount of training material shall be provided by the Contractor. The following is considered a minimum.
   a. Functional flow-charts, overall block diagrams, and descriptive material for all software;
   b. Schematic drawings for each of the hardware components;
   c. All procedure manuals, specification manuals, and operating manuals;
   d. As-built drawings.

4. Participants shall receive individual copies of technical manuals and pertinent documentation at the time the course is conducted. The courses shall be scheduled such that Owner personnel can participate in all courses (no overlap).
5. A final course schedule and syllabus shall be prepared by the Contractor for each course to be conducted for Owner personnel and submitted for review at least four (4) weeks prior to the scheduled date of the course commencement.
6. Each course outline shall include, in addition to the subject matter, a short review of the prerequisite subjects (where appropriate); how this course fits into the overall training program; the objective; the standards of evaluation; and any other topics that will enhance the training environment.
7. Provide detailed video recordings in high quality digitally formatted media of all demonstration and training of all systems and system operations.
    a. Utilize remote microphones as may be required to ensure high quality audio of the recorded demonstrations.
    b. Permanently and professionally label all recorded materials and provide self-sealing plastic cases for each training session.
8. All training requirements identified are minimum requirements.

B. Types of Training

1. User Training: System users shall be instructed in all aspects of operations of the system, including the business intelligence tool and all reporting functions and shall conform to the following minimum requirements:
    a. Training classes shall be scheduled not less than 48 hours apart to allow The Owner's User/Operators to familiarize themselves with all system operations.
        1) Basic Training: Provide twelve (12) hours of basic user training shall be provided (2-hour class repeated 6 times spaced over a two-week interval. User training shall be conducted at a location that is coordinated with the Owner.
        2) Advanced Training: Provide twelve (12) hours of advanced user training shall be provided (4-hour class repeated 3 times with six advanced users per class). User training shall be conducted at a location that is coordinated with the Owner.
        3) System Administrator Training: System Administrator Training shall be provided. System Administrator Training shall include both classroom work and field training.
        4) Software/Operational Training: Provide Twenty-Four (24) hours of software training (24 hours of training shall be repeated 1 time for 1 system administrator).
2. The Contractor shall structure each training course to describe all systems, software and applications as well as support programs. This course shall include a functional overview of the complete software and operations of each system. The course material must be presented in depth by a factory authorized instructor and shall covering in detail at the minimum all system functions, features rebooting and maintenance criteria.
3. Provide operation, parts, and maintenance manuals defining operation and troubleshooting methods of all systems and review with The Owner's User/Operators as part of training demonstrations.

4. `Provide detailed video recordings in high quality digitally formatted media of all demonstration and training of all systems and system operations.

   a. Utilize remote microphones as may be required to ensure high quality audio of the recorded demonstrations.
   b. Permanently and professionally label all recorded materials and provide self-sealing plastic cases.

3.14 PROJECT CLOSEOUT REQUIREMENTS

A. In addition to all final close requirements as specified by Division 01, specification section and related specification sections the Contractor shall provide all requirements of this section.

B. Final System Acceptance

1. In addition to the requirements set forth in Division 01, the Contractor shall prepare and issue a Certificate of Project Completion, containing:

   a. The date of project completion.
   b. A list of items that have been corrected by the Contractor.
   c. The time and date the Owner will assume possession of the system (transfer of ownership).
   d. The date that warranty begins.

2. The Owner and OAR will perform an inspection after receipt of written certification. The project completion inspection shall include, but not be limited to:

   a. The project's contracted work and any additional change orders.
   b. All equipment and systems tested and shown operational in the presence of the Owner and OAR.

3. After the inspection, the Owner and OAR will prepare and submit to the Contractor, a list of items to be completed or corrected, as determined by the inspection, along with the designated timeframe for completion.
4. Should the Owner or OAR consider the work not to be complete, the Owner or OAR will immediately notify the Contractor, in writing, stating the reasons. The Contractor shall complete the work, and then send a second written notice to the Owner and OAR certifying that the Project is complete. The Owner and OAR shall then re-inspect the work upon Contractor's request at a scheduled re-inspection time.

   a. At any time, the Owner shall have the right to Contract with a third party in order to complete and/or inspect any work of which Contractor failed to conform with the Contract requirements. All cost for this third party shall be borne by the original Contractor responsible for delivering the project.

C. Inspections

1. At the completion of the project and prior to final acceptance of the Work, provide evidence of final inspections and approvals to The Owner, in accordance with all requirements of the Contract Documents as well as required by the authorities having jurisdiction.

   a. Owner approval is required prior to final system acceptance and payment.

END OF SECTION 280500

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. UTP cabling.
2. Multimode optical fiber cabling.
3. Singlemode optical fiber cabling.
4. RS-232 cabling.
5. RS-485 cabling.
6. Identification products.

1.3 DEFINITIONS

A. Basket Cable Tray: A fabricated structure consisting of wire mesh bottom and side rails.

B. EMI: Electromagnetic interference.

C. IDC: Insulation displacement connector.

D. Low Voltage: As defined in NFPA 70 for circuits and equipment operating at less than 50 V or for remote-control and signaling power-limited circuits.

E. Open Cabling: Passing telecommunications cabling through open space (e.g., between the studs of a wall cavity).

F. UTP: Unshielded twisted pair.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated.

1. For coaxial cable, include the following installation data for each type used:

a. Nominal OD.

b. Minimum bending radius.
c. Maximum pulling tension.

B. Shop Drawings: Cable tray layout, showing cable tray route to scale, with relationship between the tray and adjacent structural, electrical, and mechanical elements. Include the following:

1. Vertical and horizontal offsets and transitions.
2. Clearances for access above and to side of cable trays.
3. Vertical elevation of cable trays above the floor or bottom of ceiling structure.
4. Load calculations to show dead and live loads as not exceeding manufacturer's rating for tray and its support elements.

C. Qualification Data: For qualified layout technician, installation supervisor, and field inspector.

D. Source quality-control reports.

E. Field quality-control reports.

F. Maintenance Data: For wire and cable to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Testing Agency Qualifications: An NRTL.

1. Testing Agency's Field Supervisor: Currently certified to supervise on-site testing.

B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.

C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Test cables upon receipt at Project site.

1. Test optical fiber cable to determine the continuity of the strand end to end. Use optical loss test set.

2. Test optical fiber cable on reels. Use an optical time domain reflectometer to verify the cable length and locate cable defects, splices, and connector; include the loss value of each. Retain test data and include the record in maintenance data.
3. Test each pair of UTP cable for open and short circuits.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install UTP, optical fiber, and coaxial cables and connecting materials until wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 PATHWAYS

A. Support of Open Cabling: NRTL labeled for support of Category 6 cabling, designed to prevent degradation of cable performance and pinch points that could damage cable.

1. Support brackets with cable tie slots for fastening cable ties to brackets.
2. Lacing bars, spools, J-hooks, and D-rings.
3. Straps and other devices.

B. Conduit and Boxes: Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems. Flexible metal conduit shall not be used.

1. Outlet boxes shall be no smaller than 2 inches wide, 3 inches high, and 2-1/2 inches deep.

2.2 UTP CABLE

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Belden CDT Inc.; Electronics Division.
2. Berk-Tek; a Nexans company.
3. CommScope, Inc.
4. Mohawk; a division of Belden CDT.
5. Nordex/CDT; a subsidiary of Cable Design Technologies.
6. Superior Essex Inc.
7. SYSTIMAX Solutions; a CommScope, Inc. brand.

8. Tyco Electronics/AMP Netconnect; Tyco International Ltd.

B. Description: 100-ohm, 4-pair UTP, formed into 4-pair, binder groups covered with a thermoplastic jacket.

1. Comply with ICEA S-90-661 for mechanical properties.
2. Comply with TIA/EIA-568-B.1 for performance specifications.
3. Comply with TIA/EIA-568-B.2, Category 5e.
4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444 and NFPA 70 for the following types:

a. Communications, General Purpose: Type CM or CMG.
b. Communications, Plenum Rated: Type CMP, complying with NFPA 262.
c. Communications, Riser Rated: Type CMR, complying with UL 1666.
d. Communications, Limited Purpose: Type CMX.
e. Multipurpose: Type MP or MPG.
f. Multipurpose, Plenum Rated: Type MPP, complying with NFPA 262.
g. Multipurpose, Riser Rated: Type MPR, complying with UL 1666.

2.3 UTP CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Hubbell Premise Wiring.
2. KRONE Incorporated.
3. Leviton Voice & Data Division.
4. Panduit Corp.
5. Siemon Co. (The).

B. General Requirements for Cable Connecting Hardware: Comply with TIA/EIA-568-B.2, IDC type, with modules designed for punch-down caps or tools. Cables shall be terminated with connecting hardware of same category or higher.

C. Patch Cords: Factory-made, four-pair cables in 48-inch lengths; terminated with eight-position modular plug at each end.

1. Patch cords shall have bend-relief-compliant boots and color-coded icons to ensure Category 5e performance. Patch cords shall have latch guards to protect against snagging.
2. Patch cords shall have color-coded boots for circuit identification.

2.4 OPTICAL FIBER CABLE

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Berk-Tek; a Nexans company.
2. CommScope, Inc.
3. Corning Cable Systems.
4. General Cable Technologies Corporation.
5. Mohawk; a division of Belden CDT.
6. Superior Essex Inc.
7. SYSTIMAX Solutions; a CommScope, Inc. brand.

B. Description: Multimode and Single mode, nonconductive, tight buffer, optical fiber cable.

1. Comply with ICEA S-83-596 for mechanical properties.
2. Comply with TIA/EIA-568-B.3 for performance specifications.
3. Comply with TIA/EIA-492 for detailed specifications.
4. Listed and labeled by an NRTL acceptable to authorities having jurisdiction as complying with UL 444, UL 1651, and NFPA 70 for the following types:

    a. General Purpose, Nonconductive: Type OFN or OFNG.
    b. Plenum Rated, Nonconductive: Type OFNP, complying with NFPA 262.
    c. Riser Rated, Nonconductive: Type OFNR, complying with UL 1666.
    d. General Purpose, Conductive: Type OFC or OFCG.
    e. Plenum Rated, Conductive: Type OFCP, complying with NFPA 262.
    f. Riser Rated, Conductive: Type OFCR, complying with UL 1666.

5. Conductive cable shall be steel armored type.
6. Maximum Attenuation:

    a. Multimode: 3.50 dB/km at 850 nm; 1.5 dB/km at 1300 nm.
    b. Single mode: 0.03 db/km at 1310 nm; 0.02 db/km at1550 nm

C. Jacket:

1. Jacket Color: Orange for Multimode, Yellow for Single mode.
2. Cable cordage jacket, fiber, unit, and group color shall be according to TIA/EIA-598-B.
3. Imprinted with fiber count, fiber type, and aggregate length at regular intervals not to exceed 40 inches.

2.5 OPTICAL FIBER CABLE HARDWARE

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. ADC.
2. Corning Cable Systems.
3. Hubbell Premise Wiring.
4. Nordex/CDT; a subsidiary of Cable Design Technologies.
5. Siemon Co. (The).

B. Patch Cords: Factory-made, dual-fiber cables in 36-inch lengths.

C. Cable Connecting Hardware:

1. Comply with Optical Fiber Connector Intermateability Standards (FOCIS) specifications of TIA/EIA-604-2, TIA/EIA-604-3-A, and TIA/EIA-604-12. Comply with TIA/EIA-568-B.3.
2. Quick-connect, simplex and duplex, Type SC connectors. Insertion loss not more than 0.75 dB.
3. Type SFF connectors may be used in termination racks, panels, and equipment packages.

2.6 RS-232 CABLE

A. Standard Cable: NFPA 70, Type CM.

1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. Polypropylene insulation.
3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
4. PVC jacket.
5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
6. Flame Resistance: Comply with UL 1581.

B. Plenum-Rated Cable: NFPA 70, Type CMP.

1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. Plastic insulation.
3. Individual aluminum foil-polyester tape shielded pairs with 100 percent shield coverage.
4. Plastic jacket.
5. Pairs are cabled on common axis with No. 24 AWG, stranded (7x32) tinned copper drain wire.
6. Flame Resistance: Comply with NFPA 262.

2.7 RS-485 CABLE

A. Standard Cable: NFPA 70, Type CM.

1. Paired, 2 pairs, twisted, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. PVC insulation.
3. Unshielded.
4. PVC jacket.
5. Flame Resistance: Comply with UL 1581.

B. Plenum-Rated Cable: NFPA 70, Type CMP.

1. Paired, 2 pairs, No. 22 AWG, stranded (7x30) tinned copper conductors.
2. Fluorinated ethylene propylene insulation.
3. Unshielded.
4. Fluorinated ethylene propylene jacket.
5. Flame Resistance: NFPA 262, Flame Test.

2.8 IDENTIFICATION PRODUCTS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Brady Corporation
2. HellermannTyton.
3. Kroy LLC.
4. Panduit Corp.

B. Comply with UL 969 for a system of labeling materials, including label stocks, laminating adhesives, and inks used by label printers.

C. Comply with requirements in Division 26 Section "Identification for Electrical Systems."

2.9 SOURCE QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to evaluate cables.

B. Factory test UTP and optical fiber cables on reels according to TIA/EIA-568-B.1.

C. Factory test UTP cables according to TIA/EIA-568-B.2.

D. Factory test multimode optical fiber cables according to TIA/EIA-526-14-A and TIA/EIA-568-B.3.

E. Factory sweep test coaxial cables at frequencies from 5 MHz to 1 GHz. Sweep test shall test the frequency response or attenuation over frequency, of a cable by generating a voltage whose frequency is varied through the specified frequency range and graphing the results.

F. Cable will be considered defective if it does not pass tests and inspections.

G. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 INSTALLATION OF PATHWAYS

A. Comply with TIA/EIA-569-A for pull-box sizing and length of conduit and number of bends between pull points.

B. Comply with requirements in Division 26 Section "Raceway and Boxes for Electrical Systems" for installation of conduits and wireways.

C. Install manufactured conduit sweeps and long-radius elbows whenever possible.

3.2 INSTALLATION OF CONDUCTORS AND CABLES

A. Comply with NECA 1.

B. General Requirements for Cabling:

1. Comply with TIA/EIA-568-B.1.
2. Comply with BICSI ITSIM, Ch. 6, "Cable Termination Practices."
3. Terminate all conductors; no cable shall contain unterminated elements. Make terminations only at indicated outlets, terminals, and cross-connect and patch panels.
4. Cables may not be spliced. Secure and support cables at intervals not exceeding 30 inches and not more than 6 inches from cabinets, boxes, fittings, outlets, racks, frames, and terminals.
5. Bundle, lace, and train conductors to terminal points without exceeding manufacturer's limitations on bending radii, but not less than radii specified in BICSI ITSIM, "Cabling Termination Practices" Chapter. Install lacing bars and distribution spools.
6. Do not install bruised, kinked, scored, deformed, or abraded cable. Do not splice cable between termination, tap, or junction points. Remove and discard cable if damaged during installation and replace it with new cable.
7. Cold-Weather Installation: Bring cable to room temperature before dereeling. Heat lamps shall not be used for heating.

8. Pulling Cable: Comply with BICSI ITSIM, Ch. 4, "Pulling Cable." Monitor cable pull tensions.

C. UTP Cable Installation:

1. Comply with TIA/EIA-568-B.2.
2. Do not untwist UTP cables more than 1/2 inch from the point of termination to maintain cable geometry.

D. Optical Fiber Cable Installation:

1. Comply with TIA/EIA-568-B.3.
2. Cable shall be terminated on connecting hardware that is rack or cabinet mounted.

E. Separation from EMI Sources:

1. Comply with BICSI TDMM and TIA/EIA-569-A for separating unshielded copper voice and data communication cable from potential EMI sources, including electrical power lines and equipment.
2. Separation between open communications cables or cables in nonmetallic raceways and unshielded power conductors and electrical equipment shall be as follows:

   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 5 inches
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 12 inches
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 24 inches

3. Separation between communications cables in grounded metallic raceways and unshielded power lines or electrical equipment shall be as follows:

   a. Electrical Equipment Rating Less Than 2 kVA: A minimum of 2-1/2 inches
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 6 inches
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 12 inches

4. Separation between communications cables in grounded metallic raceways and power lines and electrical equipment located in grounded metallic conduits or enclosures shall be as follows:

   a. Electrical Equipment Rating Less Than 2 kVA: No requirement.
   b. Electrical Equipment Rating between 2 and 5 kVA: A minimum of 3 inches
   c. Electrical Equipment Rating More Than 5 kVA: A minimum of 6 inches

5. Separation between Communications Cables and Electrical Motors and Transformers, 5 kVA or HP and Larger: A minimum of 48 inches
6. Separation between Communications Cables and Fluorescent Fixtures: A minimum of 5 inches

3.3 GROUNDING

A. For communications wiring, comply with ANSI-J-STD-607-A and with BICSI TDMM, "Grounding, Bonding, and Electrical Protection" Chapter.

3.4 IDENTIFICATION

A. Identify system components, wiring, and cabling complying with TIA/EIA-606-A. Comply with requirements for identification specified in Division 26 Section "Identification for Electrical Systems."

3.5 FIELD QUALITY CONTROL

A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

B. Perform tests and inspections.

C. Tests and Inspections:

1. Visually inspect UTP and optical fiber cable jacket materials for UL or third-party certification markings. Inspect cabling terminations to confirm color-coding for pin assignments, and inspect cabling connections to confirm compliance with TIA/EIA-568-B.1.
2. Visually inspect cable placement, cable termination, grounding and bonding, equipment and patch cords, and labeling of all components.
3. Test UTP cabling for DC loop resistance, shorts, opens, intermittent faults, and polarity between conductors. Test operation of shorting bars in connection blocks. Test cables after termination but not cross connection.

    a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.2. Perform tests with a tester that complies with performance requirements in "Test Instruments (Normative)" Annex, complying with measurement accuracy specified in "Measurement Accuracy (Informative)" Annex. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.

4. Optical Fiber Cable Tests:

    a. Test instruments shall meet or exceed applicable requirements in TIA/EIA-568-B.1. Use only test cords and adapters that are qualified by test equipment manufacturer for channel or link test configuration.
    b. Link End-to-End Attenuation Tests:

        1) Multimode Link Measurements: Test at 850 or 1300 nm in 1 direction according to TIA/EIA-526-14-A, Method B, One Reference Jumper.

2) Attenuation test results for links shall be less than 2.0 dB. Attenuation test results shall be less than that calculated according to equation in TIA/EIA-568-B.1.

D. Document data for each measurement. Print data for submittals in a summary report that is formatted using Table 10.1 in BICSI TDMM as a guide, or transfer the data from the instrument to the computer, save as text files, print, and submit.

E. End-to-end cabling will be considered defective if it does not pass tests and inspections.

F. Prepare test and inspection reports.

PART 4 - CONTRACTORS QUALITY CONTROL REQUIREMENTS

4.1 GENERAL

A. Comply with applicable provisions of Division 1 Section "Quality Requirements" for requirements for Contractor’s Quality Control Program.

END OF SECTION 280513

PART 1 – GENERAL

1.1 Related documents

A. Project drawings and general provisions of the Contract, including but not limited to all; General and Supplementary Conditions, Division 01 and all related specification sections shall apply to this section.

B. Related Sections:

1. Division 08 – Door Hardware
2. Division 26 – Common Work Results for Electrical
3. Division 26 – Low Voltage Electrical Power Conductors and Cables
4. Division 26 – Grounding and Bonding for Electrical Systems
5. Division 26 – Hangers and Supports for Electrical Systems
6. Division 26 – Raceways and Boxes for Electrical Systems
7. Division 26 – Identification for Electrical Systems
8. Division 27 – Common Work Results for Communications Systems
9. Division 27 – Network Communications Systems
10. Division 28 – Common Work Results for Safety and Security Systems
11. Division 28 – Video Surveillance System
12. Division 28 – Addressable Fire Alarm System

C. Reference Symbols:

1. All device symbols are defined by the appropriate symbol schedules. Because of the scale of the drawings, symbols are shown on drawings as close as possible to the mounting location.

   a. Contractor shall coordinate exact locations of all equipment with all site plan and architectural floor plan drawings as well as related specification sections for all affected systems and prior to submittal of any shop drawings.

D. Abbreviations:

1. Refer to specification Section 28 05 00 for additional information.

E. Definitions:

1. Refer to specification Section 28 05 00 for additional information.

1.2 SUMMARY

A. The intent of this specification is to establish a standard of quality, functions, and features for the installation and modifications necessary support the extension of the existing Genetec Access Control System (ACS) currently serving the Destin-Fort Walton Beach Airport (VPS) as indicated on the contract drawings and/or herein specified.

1. The contractor shall be responsible for providing all system layout, installation, cabling, conduits, devices, processors, power supplies and appurtenances. The contractor shall include all software revisions, existing programming modifications, commissioning, testing, and certifications necessary to provide a

complete and fully operating TCP/IP-based Access Control System for the new Satellite Concourse 'C' facility in accordance with the Contract Documents and/or as herein specified.

a. The new Satellite Concourse 'C' system shall be an extension of the existing Airport ACS and shall be sized to provide full seamless integration of the existing ACS platform.

1) Expansion and reprogramming of the existing Genetec system shall include all software revisions and server modifications as required to fully integrate the new Satellite Concourse 'C' ACS with the Airport wide physical access control network.

2. The installation, performance, features, functions, software and programming modifications as specified herein have been designed to offer the maximum system efficiency ease of operation, and occupant safety as required to maintain operational continuity of the existing Genetec system serving the Airport Campus.

a. The Contractor shall furnish and install all system components, hardware and software as herein specified. The system shall be an extension of the Authority's existing Access Control system and shall be seamlessly integrated and provide full functionality at both the Facility and the Airport ACS network.

1) The system will utilize distributed intelligent processing through the deployment of strategically located remote Intelligent Field Panels (IFP). All system panels will function as an extension of the existing airport-wide Genetec System.

2) The ACS serving the new Satellite Concourse 'C' will consist of, but not be limited to, all IFP Processors, remote Door Interface Box (DIB), smart card readers, smart card readers w/keypads, biometric/smart card readers, input devices, output devices, network communications equipment, power supplies, conduits, and cabling and will be connected back the existing Genetec server located in the Main Terminal building.

3) All IFP's will be 485 serial-based protocol and terminated in the nearest ACS IFP processor located installed in the nearest communication room and will be fully integrated with the existing VPS access control system network

3. Any deviations from the specified criteria shall be documented, reviewed and agreed to in writing by the Owner and Owner's Authorized Representative (OAR) prior to submission of bids. Refer to Division 01, and 28 05 00 specification section for product substitutions.

a. The required information shall include but not limited to: reason for deviation, all differences in performance, operation, and function from the herein specified requirements, all benefits, and added features to owner as a result of the deviations and any additional incurred costs to owner for maintenance and long-term ownership.

1) Failure to provide the Owner and OAR with the required information shall result in all shop drawing submissions being returned for non-conformance with the contract requirements.

2. It shall be the responsibility of the contractor to ensure that the installed system meets or exceeds every standard set forth in these specifications. The contractor shall be responsible for providing a complete and functional enterprise-based system, including all necessary components, devices, electrical power, software,

programming, commissioning, testing and all appurtenances as well as the integration to all ancillary systems as necessary to provide a complete and fully operational system whether specifically included in this section or not.

a. The system shall consist of, but not be limited to, all equipment, devices, remote central processors, card readers, remote door controllers panels (DCP), door lock and auxiliary power supplies, card readers, conduits, cabling, software, programming, integration of door hardware (provided by Division 08) and all appurtenances.

b. In addition, the integration of the facility's Fire Alarm System, Elevator Cars and related systems necessary to provide a complete operating TCP/IP based ACS shall be in accordance with the contract documents.

3. The ACS network shall be configured as a dedicated TCP/IP network. All structured cabling (horizontal and backbone) as well all system devices shall be installed in dedicated conduits.

a. The Contractor shall have a registered RCDD professional review and seal all system shop drawings demonstrating conformance to all Division 27 specification requirements, industry standard design, installation and certifications of any structured cabling networks related to the installation and performance of the TCP/IP based Physical Access Control System, as well related electronic security and any ancillary systems.

1) Refer to Specification section 27 05 00 and all related Division 27 specification sections for all cable installation, shop drawing requirements, and testing of all TCP/IP based cabling infrastructures.

B. The installation of the ACS shall comply with the applicable sections of NFPA-70 National Electrical Code (Article 760). The system shall be electrically supervised and monitor the integrity of all conductors. In addition, the system shall meet all applicable requirements of NFPA 72 for the integration to Protected Premises Signaling Systems, NFPA 731 for the Installation of Electronic Premises Security Systems.

1. The contractor and all sub-contractors for this work shall have read all of the General Conditions, Special Requirements, General Requirements and all applicable related specification sections and in the execution of all work shall be bound by all of the conditions and requirements therein.

C. Prior to the submission of the Bid, any discrepancies or inconsistencies noted within these specifications and/or project drawings shall be brought to the immediate attention of the Owner and Owner's Authorized Representative (OAR).

1. All equipment symbols are shown on drawings as close as possible to their intended location. Contractor shall coordinate the installation of all equipment, devices, controls, cabling and integration of any systems with all affected trades and system integrators. The Contractor shall document all coordination requirements at the time of shop drawing submissions.

2. The Contract Drawings for this work are diagrammatic and intended to convey the extent, general arrangement and locations of the work. Because of the scale of these drawings, certain basic items such as access panels, conduits, cabinet sizes, penetration sleeves, pull boxes, back-boxes and junction boxes may not be shown.

a. The contractor shall include all equipment, materials, components, device, controls and all appurtenances where required by code, by manufacturers'

recommendations, and all related Contract Documents in order to ensure proper installation operation and integration of all components, equipment, devices and/or systems.

D. The Contract drawings and specifications may not deal individually with every part, control, device, software or programming, which may be required to produce the equipment and/or system performance as necessary for the proper installation and integration of all door hardware and systems in accordance with all requirements of the Contract Documents.

1. The Contractor shall include all such items and components, as required, for the complete and operational installation of all system components as defined by the Contract Documents, whether or not specifically indicated and/or specified.

a. Include such items, as required, for a complete operational system, whether or not specifically indicated.
b. Coordinate with other applicable trades in submittal of shop drawings and the installation of all systems.
c. Shop drawings shall detail space conditions to accommodate other concerned trades, subject to final review by the Owner and OAR.
d. If installation of equipment, raceways, cable trays and/or conduit is performed prior to coordination with other trades, which interferes with work of other trades, make necessary changes to correct the condition at no additional cost to the Owner.
e. The contractor shall be responsible for providing all wiring, connections to all equipment, circuits and devices as well as all coordination and programming for the integration of all electronic door hardware, ancillary systems impacting the operation of PACS. Refer to the contract drawings and related specification sections for additional information.

E. Use of Premises

1. Refer to specification section 28 05 00 for addition information.

a. The Contractor is reminded that this is and will continue to be an operating Aviation facility. It shall be the Contractor's responsibility to become completely familiar with all existing conditions, cable terminations, and life safety systems in this facility in order to ensure proper and seamless installation and integration of all ACS system components and communications networks and cabling.

F. Coordination

1. Refer to specification section 28 05 00 for addition information.

1.2 SYSTEMS DESCRIPTION

A. All references to industry and trade association standards as well as all building codes are minimum installation requirements for this system. The codes, standards and agencies listed in specification section 28 05 00 shall form a part of this specification section and all work shall comply with the latest adopted standards.

1. The publications listed in specification Section 28 05 00 (including all amendments, addenda, revisions, supplement, and errata) shall form a part of this specification section to the extent referenced. The publications referenced in the related specification section is by the basic designations only.

a. Where the contract drawings and/or specification sections mandate a greater requirement or performance than those specified by the referenced codes and standards, the greater shall then be the governing requirements for this project. Refer to specification Section 28 05 00 for all minimum codes and standards to be applied for this project.

B. The ACS shall be modular in construction for ease of expansion and service. The system shall include all necessary equipment, components, central processors, modules, devices, integration of door hardware (provided by Division 08), TCP/IP based remote intelligent field panels (IFP), electrical power, existing system software revisions, programming modifications, commissioning and testing as necessary to provide a complete fully operational system.

1. The ACS shall include the full operational integration of all doors, garage doors, gates, and related systems where indicated on the contract drawings and/or as herein specified.
2. All ACS card readers shall employ OSDP with secure channel in accordance with SIA standards for OSDP performance and shall support the operation of Owner-issued existing contactless smart card technology.
3. Any software upgrades to the existing ACS shall support the importation of the Owner's existing identification and informational databases to permit the population of authentication and access rights for all of the Owner's employees.

   a. Where the provided software upgrades do not support third party database importation the Contractor shall include in their bid all labor costs for the manual programming of all authentication and access rights to be performed by the Contractor's personnel.

4. The ACS shall also include the complete operational integration of the Siemens Siveillance video surveillance systems in accordance with the requirements of this specification section and all related specification sections.
5. All access-controlled doors shall be fully integrated with the new Satellite Concourse 'C' Siemens fire alarm system for automatic release of all electronic locking mechanisms in accordance with the requirements of the IBC Chapter 10, and NFPA 101 Chapter 7 and NFPA 72.

   a. Access controlled egress doors shall automatically unlock upon activation of any manual pull station, automatic smoke detector, sprinkler water flow switch or special hazard suppression system per the IBC and NFPA requirements.

C. All ACS components shall be on replaceable panels and/or modules to accommodate functional changes when required. All system wiring and components shall be fully supervised so as to annunciate a trouble signal if removed or disconnected.

D. The contractor shall be responsible for providing all wiring, connections to all equipment, circuits and devices as well as all coordination and programming for the integration of all ancillary systems impacting the operation of the access control system. Refer to the contract drawings and related specification sections for additional information.

1. Note: The access control system shall be based on TCP/IP protocols and shall be configured as a dedicated structured cabled LAN. The Contractor shall furnish and install all necessary patch panels, all peripheral network components, as well as all Category-6 UTP, fiber optic cabling and appurtenances in accordance with all

requirements of the Contract documents. Refer to specification Section 21 05 00 and related Division 27 specification section for additional information related to network communications equipment, cabling requirements and testing.

2. The contractor shall assume total system responsibility for providing all inter-building wiring, any connections to the stations local and wide area networks (for remote off premises communications by the Owner, any Authority provided common carrier network equipment, integration of any Authority provided systems, equipment, and/or databases as it relates to the operation of the access control system.

1.3 REFERENCES

A. All references to industry and trade association standards as well as all building codes are minimum installation requirements for this system. The codes, standards and agencies listed in specification Section 28 05 00 shall also form a part of this specification section and all work shall comply with the latest adopted standards.

1. The publications listed in specification Section 28 05 00 (including all amendments, addenda, revisions, supplement, and errata) shall form a part of this specification section to the extent referenced. The publications are referenced in the aforementioned specification section by the basic designation only.
2. Where the contract drawings and\or specification sections mandate a greater requirement or performance than those specified by the aforementioned referenced codes and standards in section 28 05 00, shall then be the governing requirements for this project. Refer to specification Section 28 05 00 for all minimum codes and standards to be applied for this project.

1.4 SYSTEMS DESCRIPTION

A. Refer to specification Section 28 05 00 for additional information.

1.5 SUBMITTALS

A. In addition to all requirements as specified by specification Section 28 05 00 the access control system shall also be provided in accordance with the following requirements:

1. Provide a complete termination schedule of all door locations; indicate on the construction drawings door identifications corresponding with schedule.
2. Provide a complete alarm matrix for all door locations, indicate all associated alarm call-ups and camera pre-sets for every camera indicated on the contract drawings, include the related device activation and/or event for each pre-set and alarm call-up.
3. Provide a complete video surveillance camera integration schedule (where included) indicating each camera position relevant to door input location as well as a diagram indicating each termination position in the appropriate equipment cabinet intelligent system controller and/or remote door controller panel.
4. Provide a complete integration schedule indicating all ancillary system locations as well as a diagram indicating each termination position in the appropriate equipment cabinet intelligent system controller and/or remote door controller panel.
5. All integration protocols, communications connectivity and interface components to all, fire alarm, intrusion detection, emergency call, local door management alarm and video surveillance systems as well as any ancillary systems.

a. Wiring diagrams shall indicate all wiring for each field device as well as all wiring interconnections between each device and all controls and/or associated equipment, in addition, all electrical power connections with electrical circuit numbers shall be indicated to all equipment requiring electrical power.

B. Additional Submittals for Access Control Systems (ACS)

1. IFP/DIB point-to-point wiring terminations and programming matrices shall include, at the minimum, the following information:

a. IFP/DIB panel number
b. First reader number
c. First monitor point number
d. IFP/DIB input or output location
e. IFP/DIB chain number
f. IFP/DIB cabinet tamper input number
g. IFP/DIB power failure input number
h. Number of monitor points reserved for expansion
i. Number of control points (relays) reserved for expansion boards
j. System Numbers for Card Readers
k. System Numbers for Monitor Point Inputs
l. System Numbers for Control Points (Relays)
m. Next IFP/DIB or input module First Monitor Point Number
n. Next IFP/DIB or output module First Control Point Number
o. Cable ID Number
p. Description Field (Room Number)
q. Description Field (Device Type i.e.: In Reader, Out
r. Reader, etc.)
s. Description Field
t. IFP/DIB Input Location

1.6 QUALITY ASSURANCE

A. In addition to all requirements as specified by Specification Section 28 05 00 the Access Control system shall also be provided in accordance with the following requirements:

1. The access control system equipment manufacturer shall be an ISO 9001 certified company and meet the requirements of BS EN9001: ANSI/ASQ Q9001-1997.
2. All control equipment must have transient protection to comply with UL864 requirements. Where security circuits leave the building, additional transient protection must be provided for each circuit. Devices must be UL listed under standard #497B (Isolated Loop Protectors).

a. Refer to specification section 28 05 00 for additional information related to the installation of all surge and transient protection requirements.

3. The Electronic Security Systems Integrator (ESSI) shall be an established security alarm provider, duly licensed to provide security systems within in the municipality of the project location and is an authorized distributor of the equipment supplied for this project with full manufacturer's warranty privileges.
4. Installation and start-up of all systems shall be under the direct supervision of the ESSI. The system supplier shall be an accredited and authorized distributor of the equipment manufacturer of all equipment being provided and be prepared to offer a service contract for system maintenance at completion of the guarantee period.
5. The contractor shall show satisfactory evidence, upon request, that the equipment

supplier maintains a fully equipped service organization capable of furnishing adequate inspection and service to the system. The supplier shall maintain at his facility the necessary spare parts in the proper proportion as recommended by the manufacturer to maintain and service the equipment being supplied.

6. Electronic Security System Integrator shall coordinate the installation and wiring terminations for all doors equipped with electronic security protection. Refer to related electronic security system drawings and Divisions 08 and related Division 28 specification sections.

1.7 SPARE PARTS

A. Provide the following:
1. One (1) reader of each type used as a spare.
2. One (1) access control/alarm monitoring processor as a spare.
3. One (1) reader interface module for each type used as a spare.
4. One (1) power supply of each type used as a spare
5. One (1) factory box for each component, addressed to the manufacturer to facilitate factory return for repair authorizations.
6. Written procedure for obtaining return authorizations. (If not required, state so in writing.)

1.8 DELIVERY, STORAGE AND HANDLING

A. Refer to specification Section 28 05 00 for additional information

1.9 RECORD DOCUMENTS

A. Comply with all requirements of specification Section 28 05 00.

1.10 SOFTWARE AGREEMENT

A. Comply with all requirements of specification Section 28 05 00.

1.11 OPERATIONS AND MAINTENANCE

A. Comply with all requirements of specification Section 28 05 00.

1.12 EXTRA MATERIAL

A. Not Used

PART 2 - PRODUCTS

2.1 MANUFACTURED PRODUCTS

A. Comply with all requirements of specification section 28 05 00.

2.2 MANUFACTURERS

A. Acceptable manufacturers for this project, providing full compliance with this specification section and all requirements of specification 28 05 00 shall be as follows:

1. Genetec as Maintained by Authority
2. No Substitutions shall be accepted.

B. Manufacturers listed as acceptable shall not negate the contractor's responsibility for providing the ACS system in accordance with all functions and performance requirements of this specification.

2.3 SYSTEM DESCRIPTION

A. The contractor shall provide a fully operational TCP/IP enterprise based access control system (ACS). The scope of work shall include, but not be limited to, the furnishing and installation of all, access control system components, devices and equipment, connectivity to all door hardware, client work stations, cabling, conduits, and all appurtenances as required to meet the design and performance requirements as indicated on the contract drawings and/or as herein specified.

1. The Contractor shall provide the necessary integration of all door hardware (furnished under Division 08 specification), fire alarm systems, surveillance system cameras, as well as all system programming and training required to provide a fully operating system as indicated on the contract drawings and/or as herein specified.

B. The ACS shall communicate with all network servers, intelligent field panels (IFP) and local door interface box (DIB), client workstations residing on the access control systems' dedicated network by LAN/WAN connections utilizing standard TCP/IP communications protocols.

C. The system software shall take full advantage of its multi-tasking capabilities, allowing downloads of cardholder data as well as any server information to occur simultaneously while monitoring and receiving alarms from the field hardware.

1. Downloading database changes shall not interfere with any output control, access decisions, alarm monitoring, traces, or any other required function of the field hardware and alarm monitoring client workstation. Communications between the system client workstation(s) and the servers shall be interleaving so that all alarms will still report to any client workstation while downloads are occurring.
2. In the event of loss and then restoration of communications between the primary network server, database synchronization between the primary server and each remote Intelligent Field Panel (IFP) and/or local door interface box (DIB) shall be fast and efficient.

a. Every change made to the primary database shall establish a time/date stamp for the change. Once communications have been restored, database synchronization shall occur immediately and without System Operator intervention. The time-date stamp shall be compared with any changes in the system database, hardware configuration, events, or output control commands and the system shall log which changes occurred after the off-line event.

1) Any changes made to the Access Control system database while the system was off-line shall also be simultaneously downloaded to all IFP and DIB panels integrated to the system.

D. The ACS shall allow access to authorized personnel within pre-determined areas of the site, based on time and/or authorization levels. The basis of this design is to incorporate a CPU driven system with proximity card access, and to accommodate multiple door locations as well as future expansion.

E. The ACS shall provide all functions and features as herein specified, including but not limited to the following capabilities:

1. Provide the ability to regulate access through specific doors and gates to secured

areas of the facility and provide computer generated color employee and visitor credentials.

2. Shall be provided with the functional capability to automatically and/or manually call-up pre-selected video surveillance cameras, seamlessly retrieve recorded and/or stored digital video of activities from the video surveillance system.
3. Shall utilize a single seamlessly integrated relational database for all functionality. This integration shall be provided with one operating environment. The systems operating environment shall be the fully multi-tasking multi-threading and compatible with Microsoft Windows, UNIX, and LINUX operating systems.
4. The ACS shall utilize web enabled client applications capable of running on independent client operating systems including Windows, UNIX, and LINUX platforms. The web-enabled applications shall utilize the same common database as the other system modules.
5. The system shall be written so that all system modules (access control, alarm monitoring, ID Management, visitor management, digital video, etc.) are at the minimum developed and built from a unified 32-bit source code set. There absolutely shall not be a separate source code bases for the individual modules of the system.
6. The ACS shall perform all Security Management Systems (SMS) functions utilizing Human Machine Interface (HMI) terminals or Client Workstations. The HMI shall provide the principle operation platform for the control and monitoring of individual security devices, doors/gates, video surveillance cameras.
7. All Client Workstations shall employ Graphic User Interface based software (GUI) that graphically indicates all building floor/site plans and depicts all access-controlled doors, intrusion alarmed doors, and Surveillance cameras. The security management systems programming shall facilitate simple user-friendly operation and allow operators to graphically interact with the ACS.

    a. The ACS shall also include a Threat Level Management feature that allows an operator to make system-wide security changes by simply changing one parameter based on pre-set threat levels.
    b. The Threat Level feature shall provide a minimum of 5 levels that can be custom configured to change from any level to any other level shall cause execution of a series of commands to make changes to security settings including, but not limited to:

        1) Door lock and unlock status; multi-factor user authentication (i.e. card+PIN, etc.); disabling certain readers or reader groups; triggering outputs or output groups; etc.
        2) The Threat Level feature shall provide an option that requires authorized operators to input their username and password to elevate to selected levels.
        3) The Threat Level feature shall provide an option that allows an authorized operator to select an ICON on the HMI that will release magnetic hold open device on all ACS doors and automatically lock down the facility.

2. All client workstations and all remote panels residing on the network shall connect to, and monitor, all field hardware devices, such as card readers, IFP's and all integrated systems. Administrative tasks including but not limited to defining asset information, access groups, time zones, configuring digital video devices, generating reports, configuring graphic maps shall be user configurable.

a. Any client workstations shall be capable serving as both the credential creation and data input client terminal for authentication and access management functions for the system. In addition, any workstation on the network shall also capable serving as the visitor management workstation to allow for the enrollment of visitors and the scheduling of visits.

b. Any off-site client workstations shall allow for any combination of system functions and operations to be available or from any remote IP and/or dial-up client workstation that is licensed to do so. All system data must reside on a single database on the network and must be accessible in real time to all system workstations connected to the network. This shall allow for automatic change propagation to all client workstations on the system as well as a common database to consolidate all information and allow for better disaster recovery.

3. The ACS shall be fully expandable to support an unlimited number of individual modules or integrated client workstations. All access control field hardware, including access control network servers IFP's and DIB's, shall be connected to all access control system workstations on the network. All workstations shall utilize Windows, UNIX, or LINUX based software as their principle operating system.
4. The ACS shall be designed to support any industry standard thermal dye transfer ID card printer with a certified industry standard Windows, UNIX, or LINUX drivers. The system shall also support any ink jet, laser, or dot matrix printer with a Microsoft certified industry standard driver for the operating system being provided.
5. The ACS shall provide full seamless operational control and monitoring of all integrated video intercom stations and video surveillance systems.

F. Any user programmed alarm event shall cause the access control system client workstation(s) to provide an audible and visual alarm requiring the operator to acknowledge the event and enter via the keyboard to generate a historical entry and a print-out a report of the event and cause.

G. All remote client workstation(s) and servers shall be provided where indicated on the contract drawings and/or as herein specified and shall meet or exceed the requirements specified herein as well as all requirements of the access control system manufacturer.

1. All primary and remote client workstation(s) and servers shall be connected to dedicated UPS units sized to provide a minimum of 15 minutes operating time.

H. Coordinate the interface to life safety systems with the appropriate trades. Electronic locks shall not inhibit egress in the event of any emergency.

I. All ACS remote IFP's and DIB's shall seamlessly integrate with the primary access control existing network server. In addition, the remote panels shall integrate all associated door position switches, egress devices and integral proximity card reader and electric door locking hardware, as well as any hydraulic barricades, parking gates, garage doors and vehicle loop detectors. The programming at the existing access control network servers shall make the final determination of access granted and denials. All system output programs assigned via control-by-event interlock programming to be activated by valid access indication shall be executed, and the associated system outputs shall be activated.

1. All IFP's processors shall be equipped at a minimum with 16 MB of on-board memory and shall support 2 door, 4 door, 8 door or 16 door configurations as well

as providing a stand-alone dry contact remote I/O capability and shall employ OSDP with secure channel communications protocol between panel and card reader in accordance with SIA standards for OSDP performance.

2. All DIB's processors shall be equipped at a minimum with 4 MB of on-board memory and shall support 2 door, 4 door, 8 door or 16 door configurations as well as providing a stand-alone dry contact remote I/O capability and shall employ OSDP with secure channel communications protocol between panel and card reader in accordance with SIA standards for OSDP performance.

J. All Intelligent Field Panels (IFP) and remote Door Interface Boxes (DIB) shall be provided with an integral power supply and battery charger designed to charge required amp hour batteries in order to support up to 24-hours of standby system operation.

K. The ACS must be designed to perform a wide variety of functions as part of a Total Security Management Solution.

1. Provide the at the minimum the following system modules and/or functions shall be provided as part of the system installation:

a. Access Control.
b. Alarm Monitoring.
c. ID Management.
d. Digital Video.
e. Remote Access Level Management.
f. Third Party Interfaces.
g. System Administration.
h. Importation of Third-Party Data Bases and Photographs
i. Screen/Forms Creation.
j. Graphical Map Creation.
k. Application Programming Interfaces.
l. Data Import.
m. Bi-Directional Data Exchange.
n. Threat Management Functionality.
o. Video Surveillance Camera Call-up and Control

L. The system shall be capable of logging and storing minimum of 800 events in an alarm log and 800 events in trouble log. These events shall be stored in a battery protected random access memory.

1. The minimum trouble events shall be stored in the system Historical Trouble Log

a. Trouble conditions.
b. Trouble Acknowledgment.
c. Invalid Attempt.
d. Door Ajar Time out Indication.
e. Trouble Historical log cleared.

M. Time Schedule Operations:

1. Provide a minimum 256-time schedules. Time schedules are to be used for:

a. Arm/disarming of any input.
b. On/off state of any output.
c. Instructional text in response to alarms.
d. Change in state/status of any previous operator commands.
e. Enable/disable card readers and/or PIN keypads.
f. Authorized access periods.

N. User Data Base:

1. Provide as a minimum the following fields and character space for card user identification:

   a. Card Number: 9 digits.
   b. Keypad PIN: Up to 6 digits.
   c. User Time Zone: Minimum of 63.
   d. Facility Office Code: 0-99.
   e. User Number: 9 alphanumeric.
   f. Username: 32 alphanumeric.
   g. User Address: Street - 25 alphanumeric.
   h. User Address: City and Street - 25 alphanumeric.
   i. Issue Date: MMDDYY.
   j. Card Activation Date: MMDDYY.
   k. Card Deactivation Date: MMDDYY.
   l. Department/Division: 6 alphanumeric.
   m. Work-Shift Number: 1, 2, 3.
   n. Telephone Number: 12 numeric.
   o. Car Tag Number: 12 numeric.
   p. Personnel Status: 1 alphanumeric (employee, visitor, contractor, maintenance).
   q. A minimum of 50 user definable personal data fields.

O. Event Levels:

1. As a minimum, the system shall be capable of no less than six (6) different event levels.

P. Site Coding:

1. N/A. All access control cards shall be provided by the Owner

Q. Auto-Lock-Up:

1. The System shall support a Bulk Cardholder functionality that will allow an administrator to sort and select multiple cardholders, after selection various data fields including access codes, inactive date, badge type, etc. can be edited, saved and downloaded to all ISP's and DCP's, in order to facilitate the possibility of zeroing out the user time zones voiding card access entries.

2.1 MATERIALS

A. Comply with all requirements of specification section 28 05 00.

2.2 PERFORMANCE REQUIREMENTS

A. The Access Control System shall provide five (5) area control features: Hard Anti-passback, Soft Anti-passback, Timed Anti-passback, Two Person Control, and Occupancy Limit. Area control shall be a security method of preventing a person from passing their badge to another person for dual entry into a single location utilizing one card.

1. Hard Anti-passback

   a. The Hard Anti-passback feature shall require that a badge always be used to enter and exit an area. The controlled areas shall have both entry and exit card readers at all portals. Areas shall be logically defined under the system, and area control shall not be required at all areas of the facility to be utilized.
   b. Hard Anti-passback shall work in the following manner. A cardholder must

present his/her badge at the entry card reader of the area that the person wishes to enter. Once access has been granted into the area, the cardholder cannot present the badge to another entry card reader within the same area without first presenting his/her badge to the respective exit card reader of that area. Should a cardholder attempt to use any other card reader in the same area besides the occupied area's exit card reader once access has been granted to that area, the cardholder shall be denied access and an alarm shall be reported to the alarm monitoring client workstation.

c. Nested control areas (areas inside areas) shall be definable with a minimum of 64 entry and exit card readers. It shall be possible to have an area within an area and/or multiple areas that are independent of each other in which Hard Anti-passback rules shall apply.

2. Soft Anti-passback

a. The Soft Anti-passback feature shall require that a badge be used to enter and exit an area. The controlled areas shall have both entry and exit card readers at all portals. Areas shall be logically defined under the system, and area control shall not be required at all areas of the facility to be utilized.

b. Soft Anti-passback shall work in the following manner. A cardholder must present his/her badge at the entry card reader of the area that the person wishes to enter. Once access has been granted into the area, the cardholder cannot present his/her badge to another entry card reader within the same area without first presenting his/her badge to the respective exit card reader of that area.

c. It shall be possible to have an area within an area and/or multiple areas that are independent of each other.

1) Should a cardholder attempt to use another card reader in the same area besides the occupied area's exit card reader, the cardholder shall be allowed access. (If that cardholder has the appropriate authorizations to the new area), and an alarm shall be reported to the alarm monitoring client workstation.

2) The following summary criteria shall apply under Hard or Soft Anti-passback:

a) Initially (Time 0) all cardholders are reset to Area 0.

b) Any cardholder shall enter a controlled area any time after Time 0 by presenting a badge to a system entry card reader.

c) A cardholder shall not exit the controlled area unless he has entered the area presenting a badge to the system entry card reader.

d) A cardholder shall not enter the controlled area a second time unless the cardholder has exited that area previously.

e) A cardholder shall be able to enter through any entry card reader and exit through any exit card reader of a single controlled area.

f) These options include a "forgiveness" feature that will allow the System Administrator to reset the anti- passback of all cardholders to Time 0 Area 0, either through a manual override or a time zone command.

g) The system shall provide an anti-passback exempt option for

privileged or VIP cardholders. Cardholders with this option will not have anti-passback rules applied to them.

h) The system shall also have a "forgiveness" feature that will allow the System Administrator to assign "one free pass" to an individual cardholder. This will allow the System Administrator to reset the anti-passback of an individual cardholder to Time 0 Area 0.

3. Timed Anti-passback

a. Timed Anti-Passback shall allow the System Administrator to decide how long after a cardholder has swiped their badge that they will have to wait before the same badge will be accepted again at the same card reader. This helps prevent multiple swipes by an individual to allow access to others through turnstile doors.

4. Two Person Control

a. Two Person Rule shall be provided to restrict access to certain areas unless there are two (2) cardholders present. This restricts individuals from being alone in restricted or highly secure areas. When an area is configured for Two Person Rule, the following criteria shall prevail:

1) The card reader will grant access only if two valid cardholders (with authorized access levels) swipe their badges one after the other. In the event that a second authorized card is not presented within 10 seconds of the first authorized badge, the card reader shall reset and the first card will have to be swiped again.
2) Once 2 people occupy an area, individual access shall be granted.
3) Individual exit shall be permitted until an area is occupied by only 2 cardholders at which point the Two Person Rule applies for exit.

5. Occupancy Limit

a. Occupancy Limit shall restrict the number of cardholders that will be present in an area at any given time. The Occupancy Limit area shall be able to be defined by the System Administrator to limit up to 999,999 cardholders to be in that area at any given time. Once the occupancy limit has been reached, a cardholder must swipe out of the exit card reader before the next cardholder may enter. Each area for which Occupancy Limit is enabled shall be definable with up to 64 entry/exit card readers.

B. A valid read at any door, shall provide a valid access indication on the client workstation(s) and cause the door to unlock with the following exceptions:

1. A heightened security condition exists within the facility.
2. Individual does not have authorization to enter the protected space.

C. A valid read at selected exterior door locations shall provide a valid access indication on the client workstation(s) and cause the door to unlock, with the following exceptions:

1. A heightened security condition exists within the facility.
2. Individual does not have authorization to enter the facility after hours.

D. At a predetermined time, according to the days of the week, excluding holidays the access control system shall have the capability to automatically disarm the intrusion detection system open and close parking garage doors. All selected door-

locking mechanisms shall remain functional. Coordinate with the Owner and OAR all operational requirements for this feature.

E. Each individual door must have the capability of being assigned a Door Open Too Long (DOTL) Program that will initiate an alarm to the operator that the door has been left unsecured or has remained open longer than the user defined and programmed time interval.

F. Make provisions to permit operator to "shunt" an individual door alarm if appropriate operator level is utilized for reasons of frequent use or trouble; cause the following to occur:

1. Client workstation(s) will display door as zoned out of system.
2. Historical data logger will record to memory: time, date, location, operator that is signed on, and event as "shunted."
3. Journal printer will print activity.

G. Any user programmed alarm event shall cause the access control system, Client workstation(s) to provide an audible and visual alarm requiring the operator to acknowledge the event and enter via the keyboard a report of the event and cause.

2.3 POWER SUPPLIES (Door Lock and Auxiliary)

A. Provide as required UL listed power supplies with battery backup in sufficient quantities to ensure proper operation of the system and all electronic locking hardware. Power supplies shall be 12/24 volts as required to support all power requirements associated with all electronic door locking mechanisms, ancillary system controls and all manufacturers recommendations. The auxiliary power supply units shall at the minimum meet the following requirements

1. The power supplies shall size to provide power for all access control system communications equipment, electronic door locks, and/or remote ancillary panels.

a. Coordinate with door hardware provider for all electrical requirements associated with all electronic door locking mechanisms. Provide voltage drop calculations for each door locking circuit at the time of shop drawing submission.

2. The power supply shall be rated at a minimum of 6.0 amps continuous of regulated 12/24-volt power as required by the manufacturer recommendations. It shall include an integral charger designed to charge required amp hour batteries in order to support 24-hour standby power for all alarm, processor and door lock operations
3. The auxiliary power supplies shall include power limited circuitry, per 2003 UL standards and shall be UL listed for fire alarm system integration.

2.4 AUTHENTICATION CONTROL DEVICES

A. Contactless Readers

1. Furnish and install contactless and combination contactless\keypad type card readers as indicated on the Contract drawings. All contactless readers shall be ISO 14443A compliant and shall be compatible with the existing Genetec ACS and shall employ OSDP with secure channel communications protocol in accordance with SIA standards for OSDP performance between card reader and processor panel
   a. SmartCard Reader with Keypad (SCRK) - HID multiCLASS™ SE RPK40 keypad card reader.
   b. SmartCard Reader (SCR) - HID multiCLASS™ SE RP40 card reader.

2.5 DOOR CONTROL DEVICES

A. Request to Exit Device

1. Supplied and installed under the Door Hardware specification section 087100. Wired by Division 26 Contractor. Coordinate with door hardware provider for exact device type, quantities, wiring requirements and locations.

a. In addition to causing the release of the door lock, the unit shall cause the bypassing of the door contact for a period of time as determined by the Owner and OAR.

B. Door By-Pass Switches

1. Supplied and installed under the Door Hardware specification section 087100. Wired by Division 26 Contractor. Coordinate with door hardware provider for exact device type, quantities, wiring requirements and locations.

a. The door by-pass switches shall be provided for all delayed egress hardware and magnetic lock equipped doors and mounted at 48 inches on center AFF and within 5 feet of the door. Coordinate with hardware contractor and Owner's Representative for exact locations.

C. Door Position Switch/Door Contact

1. Supplied and installed under the Door Hardware specification section 087100. Wired by Division 26 Contractor. Coordinate with door hardware provider for exact device type, quantities, wiring requirements and locations.

D. Magnetic Door Locks (MAG Lock)

1. Supplied and installed under the Door Hardware specification section 087100. Wired by Division 26 Contractor. Coordinate with door hardware provider for exact device type, quantities, wiring requirements and locations.

E. Electric Door Strike

1. Supplied and installed under the Door Hardware specification section 087100. Wired by Division 26 Contractor. Coordinate with door hardware provider for exact device type, quantities, wiring requirements and locations.

F. Magnetic Door Holder

1. Supplied and installed under the Door Hardware specification section 087100. Wired by Division 26 Contractor. Coordinate with door hardware provider for exact device type, quantities, wiring requirements and locations.

G. Door Lock Power Supplies

1. Supplied under the Door Hardware specification section 087100. Installed and wired by Division 26 Contractor. Coordinate with door hardware provider for exact device type, quantities, wiring requirements and locations.

PART 3 – EXECUTION

3.1 COORDINATION

A. Comply with all requirements of specification section 28 05 00.

3.2 EQUIPMENT PROTECTION

A. Comply with all requirements of specification section 28 05 00.

1. Examine all physical and environmental conditions, door hardware specifications, equipment locations and wide area network connectivity requirements impacting the installation of the systems and report any unsatisfactory conditions in writing to the Owner and Design Professional.

3.3 INSTALLATION

A. Comply with all requirements of specification section 28 05 00.

3.4 WORK PERFORMANCE

A. In addition to all requirements as specified by Specification Section 28 05 00 the Access Control system shall also be provided in accordance with the following requirements:

1. Prior to final programming of the access control system coordinate with the Owner and OAR, all GUI based graphic screen updates, and video surveillance system integrations, all alarm functions as well as all operational features for the entire system. The contractor shall provide to the Owner and OAR a functional demonstration of all system graphics and operational features and functions prior to final programming.
2. This demonstration shall be performed on site and shall include an operational demonstration of the system for this facility. The functional demonstration shall include but not limited to, all door alarm and control functions, surveillance camera alarm call- ups as well as all automatic and manual threat level system responses.

a. Failure to provide the required coordination with the Owner shall require the contractor to provide any and all system modifications and programming changes necessary to meet the requirements of the Owner at no additional costs to the project.

3.5 EQUIPMENT INSTALLATION

A. In addition to all requirements as specified by specification section 28 05 00 the ACS shall also be provided in accordance with the following requirements:

1. All TCP\IP based physical access control system network cabling shall utilize Category-6 UTP cables and installed dedicated conduits in accordance with the requirement of specification section 27 05 00 and related Division 27 specifications. All cabling shall not contain any AC carrying conductors or non-associated system cables within the cable raceways\conduits or cable bundles.

a. All ACS cabling installed on the exterior to the building and/or all cabling being routed from the facility to any remote location external in the project shall be utilize fiber optic cable and installed in dedicated conduits.
b. Contractor shall provide equipment, components, devices, hardware, patch panels and all appurtenances necessary to provide a fully operational system utilizing a UTP cabling topography. Coordinate all system cabling with system provider prior to shop drawing submission.

2. In addition to all power requirements stipulated in specification section 28 05 00 and the related Chapters of this specification sections, all electrical power for remote system components shall be obtained from dedicated power supplies. All

120-Volt electrical power for any ACS components and\or devices shall be provided from the nearest appropriate emergency electrical distribution panels. System components employing the use of plug-in transformers for power shall not be acceptable.

a. All system power supplies serving exterior system components or devices shall be provided with the appropriate transient surge and suppression protection on both the line side as well as the load side. Refer to specification section 28 05 00 for additional requirements.

B. Installation of all equipment and devices that pertain to other work in the contract shall be closely coordinated with the appropriate trade contractors.

3.6 CABLE INSTALLATION AND REQUIREMENTS

A. Comply with all requirements of specification section 28 05 00.

3.7 COMMUNICATIONS CABLING REQUIREMENTS

A. Comply with all requirements of specification section 28 05 00.

3.8 ELECTRICAL POWER DISTRIBUTION

A. Comply with all requirements of specification section 28 05 00.

3.9 TRANSIENT VOLTAGE SUPPRESSION

A. Comply with all requirements of specification section 28 05 00.

3.10 GROUNDING AND BONDING

A. Comply with all requirements of specification section 28 05 00.

3.11 EQUIPMENT IDENTIFICATION

A. Comply with all requirements of specification section 28 05 00.

3.12 MAINTENANCE & SERVICE

A. Comply with all requirements of specification section 28 05 00.

3.13 WARRANTY

A. Comply with all requirements of specification section 28 05 00.

3.14 FIELD SERVICES

A. TESTING

1. In addition to all requirements as specified by Specification Section 28 05 00 the access control system shall also comply with the following requirements:

a. The completed access control system shall be fully tested in accordance with all requirements of NFPA 731. Upon completion of a successful testing, the contractor shall so certify in writing to the Owner and OAR all was completed, tested, certified and left in first class operational condition, include all completed NFPA 731 certification and test reports.

b. The service of a competent, factory-trained engineer or technician

authorized by the equipment manufacturer shall be provided to technically supervise installation and participate during initial system programming, start-up, final testing, and assist in the final acceptance testing as well as Owner demonstrations.

c. At the minimum all acceptance testing, demonstrations and training shall include, but not be limited to the following:

1) Security Device Monitoring/Control Functions.
2) Door Monitoring/Control Functions.
3) HMI GUI map Integration and Functionality
4) Automatic and Manual Threat Level Operations.
5) Video Surveillance System Integration and Operations
6) Video Surveillance Camera Alarm Call-up Functions
7) IDS and Emergency Call System Integration and Operations
8) Third Party Database Import Functions.
9) Network Connectivity
10) Seamless Integration of all doors and gates
11) All programming and operational functions and features as herein specified.
12) Cable Supervision System (random points to be selected by the Owner and/or OAR).

d. Demonstrate each system and subsystem. The demonstration shall include, but not be limited to the following:

1) Designate actual location of each component of a system or subsystem and demonstrate its function and its relationship to other components within the system.
2) Demonstrate the operation of all client servers, door interlock and bypass functions, camera call-up operations, graphic map functions, administration set-up, configurations and operations, badging functions and operations, emergency operations and system reboot procedures.
3) Demonstrate all systems and subsystems operations by actual "LOCK/UNLOCK, ARM/DISARM" cycling showing how to work controls, how to reset devices, how to replace fuses and emergency operating/operations procedures.

e. Upon final inspection, a factory-trained and certified representative of the equipment manufacturer shall demonstrate to the Owner that the system functions properly in every respect and is in full compliance with the contract documents. This requirement is in addition, to all testing requirements listed in specification Section 28 05 00 and related specification sections.

3.15 TRAINING

A. Comply with all requirements of specification section 28 05 00.

END OF SECTION 28 13 00

SECTION 282300 - VIDEO SURVEILLANCE SYSTEM – CAMERAS

PART 1. GENERAL

1.1 SUMMARY

A. This Section specifies requirements for video cameras, including associated equipment and accessories for video surveillance, including the following:

1. Cameras
2. Lenses
3. Housings
4. Mounting hardware
5. And all other accessories and equipment necessary for a complete camera installation.

1.2 CONSTRUCTION AND PERFORMANCE REQUIREMENTS

A. All System components shall be compatible with the existing VPS Siemens Siveillance video surveillance system. The equipment shall meet all current VPS standards for CCTV operation.

B. The electrical and electronic hardware, structural materials, and equipment housings, required for fully operational, integrated, real-time System hardware shall operate on a twenty-four (24) hour per day, seven (7) day per week basis.

C. The Contractor shall furnish only new components in current manufacturing production, manufactured to meet requirements specified herein, and free from characteristics and defects, which affect appearance, or serviceability or that renders equipment unsuitable for the intended purpose or for the initial spare parts inventory. As the spare parts inventory becomes depleted over time, due to replacement of System components, or at the discretion of the Authority, the Contractor shall have failed System components repaired or reconditioned by the manufacturer in order to replenish the spare parts inventory. The Mean Time Between Failures (MTBF) for each category of System component shall not be less than 80,000 hours.

D. The components as manufactured, furnished, and installed shall conform to the requirements of NFPA 70, all local codes, and all other publications referenced in this Section.

E. Equipment Environmental Conditions: The equipment specified in this Section shall be capable of withstanding the following environmental conditions without mechanical or electrical damage or degradation of operating capability:

1. Interior, Controlled Environment: System components installed in temperature-controlled interior environments shall be rated for continuous operation in ambient conditions of 32 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing. NEMA 250, Type 1 enclosure unless otherwise shown on the Contract Drawings.

2. Interior, Controlled Environment: System components installed in temperature-controlled interior environments shall be rated for continuous operation in ambient conditions of 0 to 122 deg F dry bulb and 20 to 90 percent relative humidity, noncondensing. Use NEMA 250, Type 3 enclosure unless otherwise shown on the Contract Drawings.
3. Exterior Environment: System components installed in locations exposed to weather shall be rated for continuous operation in ambient temperatures of minus 30 to plus 122 deg F dry bulb and 20 to 90 percent relative humidity, condensing. Rate for continuous operation when exposed to rain as specified in NEMA 250, winds up to 105 mph (137 km/h) Use Type 4X enclosures unless otherwise shown on the Contract Drawings.

1.3 REFERENCES

A. Institute of Electronic and Electrical Engineers (IEEE)
1. 802.1X Port Based Network Access Control
2. 802.3 Information Technology, Telecommunications and Information Exchange Between Systems

B. International Standards Organization (ISO)
1. 14496-14:2003 - Information technology -- Coding of audio-visual objects - Part 14: MP4 File Format

C. National Electrical Manufacturers Association (NEMA)
1. 250 - Enclosures for Electrical Equipment (1000 volts Maximum)

D. National Fire Protection Association (NFPA)
1. 70 - National Electrical Code (NEC)

1.4 QUALITY ASSURANCE

A. Qualifications
1. Retain the services of an experienced Systems Integrator and Installer to furnish all specified components who can demonstrate a minimum of 5 years of continuous experience and technical expertise in performing video surveillance work comparable in size and complexity, and whose installation and integration work was performed skillfully in a satisfactory manner and on time, and meets the following:
   a. Shall be of established reputation and experience in Video Surveillance Systems, and shall be qualified by the manufacturers of the equipment to install, service and maintain each manufacturer's equipment.
2. Retain the services of personnel certified by the equipment manufacturer to: assist in the installation of the equipment; check the installation before the equipment is placed into operation; assist in the performance of field tests; assist in the hardware configuration, and train the Authority operations and maintenance staff in the care, operation, troubleshooting and maintenance of the equipment.

a. The certified personnel shall have at least 5 years experience and in-depth knowledge of the equipment to be used in the installation, testing, and start-up of the equipment under this Section. The manufacturer's sales and marketing personnel will not be accepted as manufacturer's certified personnel.

1.5 DELIVERY, STORAGE AND HANDLING

A. Protect all equipment against damage during transit and storage. All equipment shall be shimmed, braced, blocked, and tied down to prevent distortion or other damage during transportation.

B. All materials shall be delivered in unopened factory packaging and shipping materials. Labels shall be affixed that clearly identify the manufacturer. Product name, Contract Number, storage requirements and any other special handling instructions.

C. All materials shall be properly stored and handled to prevent deterioration or damage due to moisture, weather, temperature, corrosion, contaminants, dirt, vandalism or other causes.

D. Deliver all equipment to the construction sites. If equipment is delivered to an off-site location prior to placement and installation at the construction site, transport the equipment from the off-site storage facility to the construction site, and properly store, handle and secure the equipment at the off-site storage location.

E. After delivery at the construction site, a field inspection of the equipment shall be made by the Contractor in the presence of the Engineer. If any equipment has been damaged or for any reason does not comply with the requirements hereof, the Contractor will be notified in writing by the Engineer, and the Contractor shall replace the equipment at no additional cost to the Authority even though this equipment may have been previously inspected and approved for shipment. Do not install replaced equipment until after receipt of the Engineer's written approval.

1.6 WARRANTY

A. Furnish a minimum one (1) year manufacturer's replacement warranty for all devices and equipment. All devices shall have a warranty against defects in materials and workmanship for a one-year period commencing on the Base Date and ending on the first anniversary of the Base Date. (Base Date is defined to be the day of Authority's acceptance of the completion of the 30-day Operational Testing specified herein). The warranty shall cover all components, parts, installations, and assemblies. The warranty shall cover labor to trouble shoot, repair, reprogram, replace defective components, and travel to and from the location where the equipment resides.

1.7 SUBMITTALS

A. Submit the following in accordance with the requirements of "Shop Drawings, Catalog Cuts, and Samples" of Division 1 - GENERAL PROVISIONS:

B. Qualifications Package

1. Furnish the name and address of the System Integrator

2. Submit a list of a minimum of three installations, at least one of which shall be located in the United States, which shall have included work, comparable in type, size and complexity. Said installations shall be in satisfactory operation for the last three consecutive years, at minimum. Furnish references and current contact information for each project.
3. Furnish references and current contact information for each project.
4. Furnish the resumes of all key project management, integration and installation personnel.
5. Furnish certifications of training of key personnel in the installation and maintenance of the major equipment manufacturers
6. Approval of qualification information is required prior to transmittal of any further submittals of this Section.

C. Catalog Cuts
1. CCTV Cameras
2. CCTV Camera Mounts
3. CCTV Camera Lenses
4. CCTV Camera Power Supplies (If applicable)
5. Wire, Cable and connectors associated with the installation of the system.

D. Shop Drawings
1. Bill of Materials as per the approved catalog cuts
2. System Block Diagram
3. Detailed System Wiring Diagrams, indicating all field terminal block numbers
4. Device matrices/Schedule
5. Complete, comprehensive, single-line diagrams, including all equipment, devices and cabling completely identified
6. All "red line" drawings.
7. Wire, cable, conduit and connectors
8. Enclosure and device installation details
9. Terminal block connection diagrams for all system components.
10. Detail drawings, which clearly illustrate the typical mounting configuration of each major equipment item. While some drawing details may be "typical," the drawings shall illustrate the installation detail of each unique application.
11. Detailed schematic drawings of all custom work, circuitry, and interfaces to equipment or systems not in Contract Work.
12. Fabrication ship drawings for all custom equipment.
13. Elevation drawings showing all CCTV related equipment locations and dimensions. These drawings shall also include wiring and power requirements.
14. Detailed information and drawings concerning grounding, lightning, and surge suppression.
15. Engineering calculations concerning wire sizes to ensure that the proper cable sizes have been provided.

16. Equipment Schedules and or details which define all the equipment used within the System.
17. Cameras Field of View still image confirming camera location and position.

E. Operations and Maintenance Manuals

1. Complete sets of system manuals shall be submitted explaining all system capabilities and options, including but not limited to the installation, set-up, operation and maintenance of all equipment furnished as Work of this Section, in accordance with this Section. Submittal shall be furnished in both hardcopy and digital format.

F. System Configuration Submittals

1. A minimum of 30 days before the start of the system programming, submit the complete system configuration information for the approval of the Engineer including, but not limited to, tables, schedules device matrices, screen shots and similar documentation and information to include, but not be limited to: cameras, encoders, decoders. Include information on standard operating and alarm coupled frame rates and resolution of the encoders and decoder video streaming configuration, and all additional system operation and configuration information necessary for the completion of the integration and full system operation.
2. Prepare and submit requests for programming information relating to response instructions, device numbers, and any/all special programming information.
   a. The request shall be in writing to the Engineer a minimum of four weeks prior to commencement of programming the system. As part of the request, the Programmer shall provide descriptive information of what is to be reported by the System for each device, and identify all required questions which require a response in order to complete the System's programming.
3. Request A list of all IP addressable equipment at least 60 days before the start of equipment addressing, to be coordinated with the Engineer.
4. Certification from the manufacturer representative that all systems and components have been installed in accordance with their direction and requirements.

G. Acceptance Testing

1. Submit comprehensive Acceptance Test Plans that describe all the activities and tasks associated with testing of the System in accordance with the requirements of this Section. The test plan shall include a comprehensive description of the Site Acceptance, Final Acceptance and Operational Acceptance testing to be performed.
2. Furnish the following:
   a. Preliminary Test Reports
   b. Factory Acceptance Test Plan
   c. Factory Acceptance Test Results
   d. Final Site Acceptance Test Plan
   e. Final Site Acceptance Test Results
   f. 30 day operational Test

g. 30 day operational test results

h. A test and certification reports for all twisted pair Ethernet and fiber optic cables installed as Work of this Section.

3. Upon completion of 30 day Operational Acceptance Testing submit:

a. As-Built Drawings and Shop Drawings, which reflect actual locations and actual wiring details of system equipment and all revisions to the Work of this Section. One set shall be printed on reproducible mylar.

b. Hardware Documentation shall be provided in hard copy and digital format.

c. A hard copy back-up of all database and configuration settings.

d. Electronic backup of all software, database and configuration settings to allow for system recovery and restoration.

e. A detailed outline of the training information as described in this Section.

H. Certification from the manufacturer representative that all systems and components have been installed in accordance with their direction and requirements.

1.8 SPARE PARTS

A. Furnish 5 percent spare parts, or a minimum of one, whichever is greater, of each component.

B. Submit a list of recommended spare parts, including quantities for approval.

C. After approval of spare parts list, and prior to start of operational Acceptance Testing, furnish spare parts to the Authority.

PART 2. PRODUCTS

2.1 MANUFACTURERS

A. Refer to Camera Schedule on Contract drawings for manufacturer and model of cameras, lenses and associated equipment.

2.2 GENERAL REQUIREMENTS

B. Provide video communications between the points of surveillance, the location(s) of storage, and the location(s) of the connected security workstations and CCTV monitor(s) specified herein or on the Contract Drawings.

1. Cameras: The number of CCTV cameras to be supplied shall be as shown on the Contract Drawings.

2. Configuration: The configuration of the CCTV communications system shall conform to IEEE 802.3, with signals provided at standard Ethernet TCP/IP levels (+/- 2.5 volts).

B. CCTV cameras shall be powered via a network switch using an industry accepted Power-over-Ethernet (PoE, POE+) method as described in IEEE Standards 802.3af and IEEE 802.3at unless otherwise shown on the Contract Drawings.

C. All electrical materials and equipment for which there are established UL standards shall bear the UL label.

D. Cables

1. Refer to custom Specification Section 271000 for video, control and communication cable requirements.

E. The Contractor shall verify proper camera operation with the Engineer, including but not limited to field-of-view, direction, pan-tilt-zoom, video storage, and bandwidth usage.

F. The Contractor shall coordinate with the Engineer any work related to the VPS Network. Contractor shall notify the Engineer of the quantity, type, and location of network connections (number of ports) that will be required to connect the installed CCTV cameras to the existing VPS CCTV system. Contractor shall provide switched data ports from new Ethernet switches & bandwidth requirements for the network equipment to the existing VPS CCTV system.

G. The Contractor shall be responsible for all field verification and coordination of dimensions and camera lens type for optimal field of view and ease of adjustment with the entity manufacturing the equipment. Any change in equipment shall be submitted to the Engineer for approval prior to equipment purchase.

2.3 CAMERAS

A. Pan/Tilt/Zoom IP Camera

1. Cameras shall be enclosed in a standard housing. Housings shall be complete with all accessories as specified on the Contract Drawings and as specified below.
   a. The camera shall be a discreet camera dome system consisting of a dome drive with a variable speed/high speed pan/tilt drive unit with continuous 360° rotation.
   b. Camera shall have a weather resistant aluminum die cast with a sunshield of ASA resin coating. The dome shall be clear polycarbonate resin.
2. PTZ and Fixed cameras shall be day/night, high performance, wide dynamic range. Each camera shall include the features specified below:
   a. PTZ camera Specifications:
      (1) 1/3 type CMOS sensor
      (2) 30x Optical Zoom with extra zoom up to 90x
      (3) Resolution: Full HD up to 30 images per second
      (4) Lens: f/1.6 motorized ~ Close (9.0 mm ~ 22.0 mm optical)
      (5) Horizontal Angle of View: 33° (wide) ~ 13.8° (tele
      (6) Light Sensitivity:
         (a.) Color: 0.15 lux
         (b.) B/W: 0.018 lux
      (7) Day/Night capabilities
      (8) Wide Dynamic Range: 133dB typical (Super Dynamic: ON, Light Control: Indoor)

(9) Iris Control: Auto iris with manual override
(10) Digital noise reduction
(11) Basis of design: Axis model P5655-E PTZ Network Camera

b. Fixed camera Specifications:
(1) 1/3 type CMOS sensor
(2) 2.4X Optical Zoom that extends to 7.2X with extra zoom
(3) Up to 4X Digital Zoom controlled by browser GUI
(4) Resolution: Selectable up to 1920 x 1080 at 30 images per second
(5) Lens: f/1.6 motorized ~ Close (9.0 mm ~ 22.0 mm optical)
(6) Horizontal Angle of View: 30.9° (wide) ~ 105.4° (tele)
(7) Light Sensitivity:
(a.) Color: 0.04 lux
(b.) B/W: 0.01 lux
(8) Day/Night capabilities
(9) Wide Dynamic Range: 133dB typical (Super Dynamic: ON, Light Control: Indoor)
(10) Iris Control: Auto iris with manual override
(11) Digital noise reduction
(12) Basis of Design: Axis model Q3517LVE 5MP and Q3515-LVE 1080P Network Cameras

c. Multi-Sensor 180/360 Degree Camera Specifications:
(1) 1/2.5 type CMOS sensor
(2) 12X Digital Zoom
(3) Up to 12X Digital Zoom controlled by browser GUI
(4) Resolution: Selectable up to 1920 x 1080 at 30 images per second
(5) Maximum Streams: 3 simultaneous streams
(6) Field of View: 180° (Horizontal) / 180° (Veritcally) / 180° (Diagonally)
(7) Light Sensitivity:
(a.) Color: 0.6 lux
(b.) B/W: 0.01 lux
(8) Day/Night capabilities
(9) Wide Dynamic Range: Above 60 dB
(10) Digital noise reduction
(11) Basis of Design: Axis model Q3708-PVE Network Camera

d. Minimum Video Specifications:
(1) Video encoding: H.264 and MJPEG
(2) Transmissions for two streams can be individually set in the same compression method (for H.264)
(3) Frame rate: Up to 30 images per second
(4) Available Resolutions:

(a.) 2 mega pixel aspect ratio [16:9] : 1920 x 10800 / 640 x 360 / 320 x 180

(b.) 1.3 mega pixel aspect ratio [16:9] : 1280 x 720 / 640 x 360 / 320 x 180

(c.) 1.3 mega pixel aspect ratio [4:3] : 1280 x 960 / 640 x 480 / 320 x 240

(5) Supported Protocols: TCP/IP, UDP/IP (Unicast, Multicast), UPnP, DNS, DHCP, RTP, RTSP, NTP, IPv4, IPv6, SNMP, HTTP, HTTPS, SMTP, FTP,

e. Electrical Specifications

(1) RJ-45 port for 10Base-T/ 100Base-TX

(2) Input power: PoE+ IEEE 802.3at compliant or 24VAC external power supply.

f. Dome Drive Specifications

(1) Pan movement: 360º continuous pan rotation

(2) Pan speed: Variable between 300º/second continuous pan

(3) Vertical tilt: Unobstructed tilt of -15º to 195º

(4) Manual control speed: Pan speed of 0.065º to 120º per second up to 256 steps; tilt operation shall range from 0.065º to 120º per second up to 256 steps.

(5) Automatic preset speed: Pan speed up to 300º per second and a tilt speed of up to 300º per second

(6) Presets: 256 positions

g. Back Box and Lower Dome

(1) Pendant, Standard

(2) Connection to dome drive: Quick, positive mechanical and electrical disconnect without the use of any tools

(3) Installation: Quick-mount wall, or pendant

(4) Cable entry: Through 1.5-inch NPT fitting

(5) Operating Temperatures:

(a.) PoE+ Power source: –30C° to 55°C (-22°F to 131°F). 90% or less humidity (without condensation).

(b.) 24VAC Power source:–50°C to 55°C (-58°F to 131°F) with limitations

(6) Construction: Aluminum

2.4 Camera Mounts

A. Furnish and install an appropriate mount for each camera being furnished and installed under this Contract. Mounting details on drawings are suggestive in nature. Refer to manufacturer's recommended mounting types for each location.

B. Survey the camera locations and submit different mounting methods as required by field conditions.

C. Furnish and install conduit adapters and related items as required.

D. Camera mounts shall provide a non-vibrating, adjustable support for camera and enclosure with wire routing accessibility.

E. Cameras shall be mounted to the wall, or other structure using a pendant, wall, or gooseneck mount as shown in the Contract Drawings. Contractor shall coordinate mounts with surrounding areas and submit all mounting details for approval.

F. Camera mounts shall be outdoor rated, corrosion resistant, and utilize tamper proof hardware.

2.5 Camera Power Systems

A. All CCTV cameras shall be powered via a network switch using an industry accepted Power-over-Ethernet (PoE) and Power-over-Ethernet Plus (PoE+) method as described in IEEE Standards 802.3af and 802.3at.

2.6 PoE Ethernet Switches

A. All cameras shall be routed back to a Network switch as shown on the Contract Drawings.

B. Cisco switches shall be furnished and installed by the Contractor and programmed by the Authority. Contractor shall provide all required mounting hardware and wiring.

PART 3. EXECUTION

3.1 INSTALLATION

A. Video Surveillance equipment installation shall include:

1. Conduit and raceways
2. Wiring and cabling
3. Verification of equipment power requirements
4. Equipment and device circuiting
5. All necessary device licenses
6. Anchoring and securing of equipment
7. Restoration of finishes incidental to the installations

B. Video Surveillance Camera Installation:

1. Install all System equipment and materials in accordance with the manufacturer's recommendations, the approved shop drawings, and the requirements of this Section and the Contract Drawings.
2. Verify all finished surface dimensions and materials and coordinate junction and mounting box type and cover with camera mounting bracket accordingly. Review camera mounting back boxes, brackets and concealed cable feeds to camera housing with the Engineer prior to installation of camera back box, to ensure adequate blocking is provided for structurally sound installation and appropriate bracket/dome housing mounting.

3. Locate all equipment which must be serviced, operated, or maintained in fully accessible positions, especially when located in concealed locations. If required, for better accessibility, Contractor shall coordinate the installation with the trade in which the access door will be mounted to furnish access doors for this purpose. All access doors shall be approved by the Engineer.
4. Camera installation and field-of-view adjustment: All cameras shall be located, position confirmed, rotated and calibrated to provide for optimal fields of view. Prior to installation, each camera location, lens setting and mounting type shall be field-confirmed, by generation of a still image (screen shot from a camera and lens configuration identical to that proposed- on a pole, with laptop to capture a picture of the intended field of view) to be submitted for approval before the camera mount and conduit is installed at each location.
5. Minor equipment location deviations from the Contract Drawings may be made to allow for better accessibility, but all such deviations shall be approved by the Engineer prior to any work being performed.
6. Aim, adjust, align, focus, and perform all necessary system set-ups to achieve required viewing image performance.
7. The Contractor shall be responsible for all field verification and coordination of dimensions and camera lens size for optimal field of views with the entity manufacturing the equipment. Any lens changes required to achieve the desired field of view shall not present any additional cost to the Authority.
8. Ensure that no conductive path exists between the shield of the video cable and the chassis of the associated video equipment. Configure all cable connections and video equipment mounting to eliminate ground loop distortion. Add differential ground loop correctors, clamper amplifiers, or other suitable equipment, as required to achieve distortion-free imaging and recording.

C. Miscellaneous Video Surveillance Installation Requirements:
1. All hardware, such as shields, nuts, bolts, washers, and shims, shall be stainless steel, minimum Type 304.
2. Leave at least 10-feet of adequate cable slack at camera outlets and at equipment racks and cabinets to allow proper servicing of equipment.
3. Provide self-tapping set screw at threaded pipe joints.

D. Contract Drawings are diagrammatic in nature and exact routing requirements vary slightly with different manufacturers and job conditions. The Contract Drawings represent a schematic depiction of the CCTV System conduit, cable tray, and wire network layout for the system equipment specified. Final conduit, cable tray and wire quantity, size, and arrangement, as well as final routing and placement shall be based on system equipment, manufacturer's engineering requirements, field coordination with other trade work, existing building conditions and as a result of other trade equipment which must be connected to. Exact installation shall be submitted on shop drawings to be approved by the Engineer.

E. Contractor shall field verify length of any Ethernet cable does not exceed 300 ft. If a Power-over-Ethernet (PoE) extender is used, Contractor shall ensure each Ethernet cable segment does not exceed 300ft. PoE extenders may only be used where shown on the Contract Drawings or otherwise approved by the Engineer.

1. PoE extenders shall not be daisy-chained together. Only one (1) PoE extender may be used per camera.
2. PoE extender shall be installed in a NEMA 4X box concealed from public view.
3. Provide an access hatch in the architectural ceiling to service the PoE extender.
4. PoE extender locations shall be documented in the associated CCTV field cabinet to assist maintenance personnel with troubleshooting.

F. Carefully coordinate the Work of this Section with all affected trades.

G. Coordinate all cable, conduit and device identifiers with the Engineer. Ensure uniformity and interrelation of identifiers. Avoid identifier duplication.

H. All equipment shall be installed according to Specifications Sections 260526 Grounding and Bonding requirements.

3.2 TESTING:

A. Manufacturer's Field Service: Engage personnel certified by the equipment manufacturer to inspect, test, and adjust components, assemblies, and equipment installations, including connections.

B. Acceptance Testing shall be divided into three distinct phases as follows:

1. Factory Acceptance Testing
   a. Conduct a factory test for the components encompassing the specified system a minimum of 30 days in advance of the earliest, approved, scheduled installation date. Submitted test results shall clearly demonstrate the system components are meeting the requirements of this Section.
2. Final Acceptance Testing
   a. Conduct an onsite inspection and test immediately following the complete installation of the system, to demonstrate compliance with the requirements of this Section. Test shall be performed in presence of the Engineer in order to clearly demonstrate the system is meeting the requirements of this Section.
3. 30 Day Operational Testing
   a. The Authority will conduct a 30 day operational or "burn in" test with the assistance of the Contractor immediately following the successful completion of the Final Acceptance Test, to demonstrate compliance with the requirements of this Section. Test shall clearly demonstrate the system meets the requirements of this Section.

C. Contractor shall develop a full test procedure in coordination with Siemens Inc. Submit to the Engineer for approval.

3.3 OPERATION AND MAINTENANCE MANUALS

A. Provide 6 hard copies of all maintenance and operations manuals to the Engineer in a three ring binder. Provide 2 soft copies on DVD/Thumb Drive of all maintenance and operations manuals.

3.4 TRAINING

A. Contractor shall provide all required material for all new equipment furnished under this contract.

3.5 MAINTENANCE

A. Contractor is responsible to provide all maintenance of equipment while system is installed on temporary structures. Maintenance will continue when installed in the final location until final acceptance of the equipment. All other requirement as indicated in the contract documents and drawings also apply.

END OF SECTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Project drawings and general provisions of the Contract, including but not limited to all General and Supplementary Conditions, Division 01 and all related specification sections shall apply to this section.

B. Related Specification Sections:

1. Division 26 – Common Work Results for Electrical
2. Division 26 – Building Wire and Cable
3. Division 26 – Grounding and Bonding
4. Division 26 – Hangers and Supports
5. Division 26 – Conduit
6. Division 26 – Outlet Boxes
7. Division 26 – Pull & Junction Boxes
8. Division 26 – Underground Ducts & Raceways for Electrical Systems
9. Division 26 – Identification for Electrical Systems
10. Division 28 – Common Work Elements for Electronic Safety and Security Systems
11. Division 28 – Physical Access Control

C. Reference Symbols:

1. Refer to specification section 28 05 00 for addition information.

D. Abbreviations:

1. Refer to specification section 28 05 00 for addition information.

E. Definitions:

1. Refer to specification section 28 05 00 for addition information.

1.2 SUMMARY

A. This Section includes basic design requirements for the installation of a new Siemens FV2050 Desigo fire alarm system with voice evacuation. Including all necessary modifications to the existing Siemens fire alarm network and as required to fully integrate the new fire alarm system with the existing Airport fire alarm platform in accordance with all requirements of the Contract Documents and as herein specified.

1. The addressable Fire Alarm System shall at the minimum include sufficient control panel(s), fire fighters control station, remote annunciator(s), remote transponder panels (RTP), manual stations, automatic fire detectors, control and monitoring devices, amplifiers, notification appliances, cabling, conduits, and appurtenances as well as all necessary labor, programming, commissioning and testing as required for the installation of complete fully operating fire alarm system serving the new Satellite Concourse 'C' as well as for the proper integration with the existing Airport site-wide fire alarm platform.

a. The Contractor shall include all necessary labor, equipment, materials, software and programming modifications in connection with the modifications to the existing Siemens fire alarm network as required to fully and seamlessly integrate all new Satellite Concourse 'C' fire alarm system with the existing fire alarm platform in accordance with all requirements of the Contract Documents and as herein specified.

2. The basis of design shall be the Siemens FV2050 Desigo Intelligent Addressable Fire Alarm System with Voice Evacuation in order to ensure Airport wide compatibility. The system shall be installed in accordance with the Contract Documents and wired, connected, and left in first class operating condition.

a. No substitutions to the Siemens Fire Alarm system shall be accepted.

B. In addition to the above, the fire alarm system shall also include the integration of the following ancillary systems in accordance with all requirements of the Contract Documents as well as all applicable codes and standards.

1. Wet and Dry Pipe Sprinkler Systems
2. Pre-Action Sprinkler Systems
3. Kitchen Suppression Systems
4. HVAC Shutdown
5. Smoke Exhaust and Stair Tower Pressurization Systems
6. Building Management System (BMS)
7. Elevator Phase I Fire Fighters Operations
8. Access-Controlled Egress Doors
9. Siemens Graphic User Interface Computers
10. Automatic Smoke Doors and Shutters
11. Access Controlled Doors

C. The intent of this specification is to establish a standard of quality, function and features. It is the responsibility of the Contractor to ensure that the proposed products meet or exceed every standard set forth in these specifications. This contractor shall be responsible for providing a complete functional system including all necessary components whether specifically included in this section or not.

D. In addition, this section also addresses all requirements for submittals, quality assurance, product handling, record documents, project conditions, installation, system performance, demonstrations, testing, and certifications related to the installation of the fire alarm system for this project. Refer to specification section 28 05 00 for additional project requirements.

1. All symbols are shown on the contract drawings as close as possible to their intended location. Contractor shall coordinate the installation of all conduits, cabling, devices, controls, components, and integration of systems as herein specified. The Contractor shall document all coordination requirements with all affected trades and sub-Contractors at the time of shop drawing submission.

2. Drawings for this work are diagrammatic and intended to convey the extent, general arrangement, and locations of the work. Because of the scale of the drawings, certain basic items such as access panels, conduits, cabinet sizes, penetration sleeves, pull boxes, back-boxes and junction boxes may or may not be shown on the contract drawings. Include all items where required by code and related specification sections as required for the proper installation of all backbone and riser infrastructure scopes of work.

E. Use of Premises

1. Refer to specification section 28 05 00 for addition information.

a. The Contractor is reminded that this is and will continue to be an operating Aviation facility. It shall be the Contractor's responsibility to become completely familiar with all existing conditions, cable terminations, and life safety systems in this facility in order to ensure proper and seamless installation and integration of all communications networks and cabling.

F. Coordination

1. Refer to specification section 28 05 00 for addition information.

1.3 SCOPE OF WORK

A. Refer to related Division 28 specification sections and "Fire Alarm" series drawings for the proper installation of the new Fire Alarm System serving the new Satellite Concourse 'C' of the Destin Fort Walton Beach Airport (VPS).

1. In addition, refer to related Division 28 specifications sections, all related "Fire Alarm" series drawings as required to include all project scopes of work impacted by the installation of any related systems and infrastructures associated with all project scopes of work impacted by the installation of the Fire Alarm System.

a. At the minimum, the scopes of work covered as herein specified shall include but are not limited to all necessary coordination, labor, equipment, materials, cabling, commissioning, programming and testing as required for the proper integration of any Division 14, Division 21, Division 23, Division 26, Division 27 and related all Division 28 systems impacted by the installation of the fire alarm system.

2. All scopes of work covered as herein specified shall include but are not limited to all necessary labor, equipment, materials, cabling, conduits commissioning, and testing as well as all appurtenances as required for the proper installation necessary to deliver fully functional fire alarm system.

a. It shall be the Contractor's responsibility for full compliance with all requirements of 28 05 00 as well as all related Division 14, 21, 23, 26, and Division 28 Specification sections necessary to fully integrate the fire alarm system in accordance with all requirements of all Contract Documents and applicable codes and standards.

1.4 REFERENCES

A. In addition to the references as stipulated by Specification Section 28 05 00 as well as all related specifications sections, the Contractor shall also conform with the following requirements:

1. Approvals

a. The system and all components shall have the proper listing and/or approval from the following nationally recognized agencies:

1) UL-Underwriters Laboratories Inc
2) FMG- Factory Mutual Global

b. The fire alarm control panel shall meet UL Standard 864 (Control Units)
c. The system shall be listed by the referenced national agencies as suitable for fire extinguishing releasing applications.

1.5 SUBMITTALS

A. In addition to the submittal requirements as stipulated by Division 01, Specification Section 28 05 00 as well as all related specifications sections, the Contractor shall also conform with the following submittal requirements:

1. The Contractor shall provide an identical submission to all authorities having jurisdiction for review and permitting. Include copies of all annotated Shop Drawings sealed by registered engineer indicating all information as defined by Specification Section 28 05 00 to facilitate proper review. Resubmit if required to make requested clarifications or revisions to obtain final AHJ approval and permits.

a. On receipt of comments from authority and prior to the start of any construction, submit to the Owner and OAR for review, a complete copy of all AHJ approved drawings. Failure to comply with this requirement shall extend all liabilities to this Contractor for any modifications necessary to the system in order to obtain a Certificate of Occupancy.

2. Provide a complete set of shop drawings. Drawings shall include sufficient information, clearly presented, to determine full compliance with all project drawings and specifications as well as required by NFPA 72. Include the following information for review, failure to provide all information listed below shall result in all shop drawing submittals being returned for resubmission:

a. All equipment manufacturers' names and model numbers.
b. All equipment /device electrical ratings and power requirements.
c. All battery calculations for all control panels, remote panels and auxiliary power supplies integrated with the fire alarm system.
d. Voltage drop calculations for all initiating, notification and auxiliary circuits.
e. Component layouts, mounting elevations and installation details for all control panels, remote transponder panels and auxiliary power supply panels,
f. Typical device wiring details of all equipment, devices and integrated systems and/or equipment.
g. Complete point-to-point-wiring diagrams for all equipment, devices and integration with all systems and/or equipment associated with the installation, operation and/or connection to the fire alarm system.
h. Integration and connectivity of the following systems;

1) Wet and Dry Pipe Sprinkler Systems
2) Deluge Sprinkler Systems
3) Kitchen Suppression Systems
4) HVAC Shutdown
5) Building Management System (BMS)
6) Automatic Smoke Doors
7) Elevator Phase I Fire Fighters Operations
8) Access-Controlled Egress Doors
9) Siemens Graphic Computers

3. Wiring diagrams shall indicate wiring for each field device and all interconnections between each device and all controls and/or associated equipment.
4. Provide a complete set of Contractor prepared detailed construction drawings. Drawings at the minimum shall consist of building floor plans indicating all fire alarm device locations, device addresses, control panels, auxiliary panels' remote annunciator and/or control panels.
   a. Failure to provide a complete set of detailed construction drawings at the time of shop drawing submittal shall result in all submittals being returned for resubmission.
5. Include all equipment data sheets pertinent to all equipment provided. All data sheets shall be highlighted indicating specific equipment supplied. Failure to provide proper annotation of all devices at the time of shop drawing submittal shall result in all submittals being returned for resubmission.
   a. Include all performance parameters and installation details for each detector, verifying that each detector is listed for complete range of air velocities, temperatures, and humidity possible when air-handling system is operating.
6. Provide a complete clear and concise <u>sequence of operation</u> that gives, in detail, all information describing all system functions, features and operations.
   a. Include detailed programming matrixes for all system devices, equipment, controls and all systems integrated with the fire alarm system. The sequence of operations shall at the minimum include all manual and automatic functions, all system operations, all instructions for the resetting and disabling of all system controls, field devices and integrated system interfaces.
   b. Include detailed alarm programming matrixes for all field devices, system components and all associated systems integrated with the fire alarm system.

B. The Contractor shall maintain a complete set of current and up to date shop drawings and equipment submissions at the job site at all times. Shop drawings, equipment submissions and all other documents submitted for review shall be made available on site to the Owner and OAR upon request.

1.6 QUALITY ASSURANCE

A. In addition to the requirements as stipulated by Specification Section 28 05 00 as well as all related specifications sections, the following shall also apply:

1. The fire alarm equipment provider shall employ technicians on site to provide system certification and programming and testing in accordance with NFPA 72 requirements and shall be fully licensed to provide fire alarm systems within the municipality of the project and shall be NICET certified (minimum Level III Fire Alarm Technology).

1.7 DELIVERY, STORAGE AND HANDLING

A. Refer to specification section 28 05 00 for addition information.

1.8 OPERATION AND MAINTENANCE

A. Refer to specification section 28 05 00 for addition information.

1.9 RECORD DOCUMENTS

A. In addition to all requirements as specified by Specification Section 28 05 00 the fire alarm system shall also be provided in accordance with the following requirements:

1. Provide a complete set of as-built drawings incorporating all final installation and field conditions. Drawings shall an exact representation of all shop drawings maintained on site.

   a. The drawings shall clearly indicate the differences between original shop drawing submissions and final as-built conditions. Contractor shall annotate all changes as result of OAR directed changes the project and/or resulting from coordination with affected trades.

2. Provide a complete and current copy of all fire alarm system programming in accordance with all requirements of the paragraph 1.11 of this specification.

3. Chapter 1.5 of this section shall form the basis of all information necessary to deliver a complete set of Record Documents which shall be required for final acceptance of the completed fire alarm installation.

1.10 SOFTWARE AGREEMENT

A. Included as part of the scope of work for this project the Owner shall retain ALL ownership and Access rights to the complete programming for the system as installed. Any manufacturer that restricts ownership and/or licensing rights of the system programming installed at the Owner's premises or claims that the system programming is protected by proprietary ownership by the installing Contractor the product and/or manufacturer shall be deemed unacceptable for this project:

1. The Contractor shall provide to Owner a complete copy of all system programming prior to final acceptance of the system. Programming shall include but not limited to all device identifications, device descriptions, and all programming access level passwords as well as all function routines and sub-function routines.

   a. Programming copies shall be provided to Owner on a digitally formatted media in addition, the Contractor shall provide a complete hard copy printout of all system programming and shall be included as part of close-out documentation for review by the Owner and OAR.

      1) Failure to provide Owner and OAR at the time of project close out, complete copies of all fire alarm system programming shall result in the entire fire alarm system being declined for final acceptance.

b. Upgrade Software Service: Included in the cost of this project shall be an automatic software upgrade policy, which shall maintain all software to latest version. This upgrade policy shall require the Contractor to install and program all software upgrades that become available from manufacturer for a period of one year from date of final acceptance:

1) Upgrading of software shall include all revised/new software, labor, testing recertification as well as all licenses and all programming copies as described in sub-paragraph "A" of this section for use of any new and/or revised software.

a) Provide not less than thirty days' notice to Owner to allow scheduling and access to system and to allow Owner to upgrade computer equipment if necessary

1.11 EXTRA MATERIAL

A. Not Used

1.12 SYSTEM DESCRIPTION

A. The Addressable Fire Alarm System shall perform, and function as herein specified and shown on the contract drawings. The system shall be wired, connected, and left in first class operating condition in accordance with all applicable life safety codes, related specification sections and manufacturer requirements.

1. The fire alarm system shall be an active/interrogative type system where each remote transponder and/or addressable device is repetitively scanned, causing a signal to be transmitted to the Concourse's main Fire Alarm Control Panel (FACP), all Fire Alarm Remote Annunciator Panels (FAAP) and the primary and secondary Siemens GUI based Graphic Computers.
2. At the minimum, the fire alarm system shall report to all above locations indicating any alarm, trouble and supervisory condition from all fire alarm initiating and notification devices. In addition, all remote Data Gathering Panels (DGP), Amplifiers Battery conditions and/or all associated circuits are currently functional. Change of any condition shall result in the transmission of a signal at the FACP, FAAP and all GUI's .

a. The fire alarm system shall allow for loading and editing special instructions and operating sequences as required. The system shall be capable of onsite programming to accommodate system expansion and facilitate changes in operation.

1) All software operations shall be stored in a non-volatile programmable memory within the fire alarm control panel. Loss of primary and secondary power shall not erase the instructions stored in memory. Alarm signals arriving at the main FACP shall not be lost following a primary power failure (or outage) until the alarm signal is processed and recorded.

b. Full flexibility for selective input/output control functions based on ANDing, ORing, NOTing, timing, and special coded operations shall also be incorporated in the resident software programming of the system.

1) Resident software shall allow for full configuration of initiating circuits so that additional hardware shall not be necessary to accommodate changes in system function and performance.
2) Resident software shall also allow for configuration of indicating appliance and control circuits so that additional hardware shall not be necessary to accommodate changes.

c. The system shall have the capability of recalling alarms and trouble conditions in chronological order for the purpose of recreating an event in history.

1.13 SYSTEM OPERATION

A. The system fire alarm operation subsequent to the alarm activation of any manual station, automatic detection device, sprinkler flow switch or FM-200 or Deluge or sprinkler pre-action control shall be as follows:

1. Display all alarm location information at the Fire Alarm Control Panel.
2. Display all alarm location information on all annunciator panels. (FACP, FFCS, FAAP and all GUI's)
3. All alarm notification appliances shall sound simultaneous throughout all protected spaces in accordance with respective zoning, until silenced by the appropriate switch at the fire alarm control panel and shall meet the following performance criteria.

   a. A pre-announcement tone shall be provided followed by a field programmable digitized custom evacuation message, on the floor of the alarm, the floor below and the floor above if such floors exist.
   b. A simultaneous message shall be delivered via all alarm speakers installed on the remaining floors indicating the requirement for occupants of these floors to remain alert for further instructions.
   c. A simultaneous message shall be delivered via all alarm speakers installed in stairways and elevators informing occupants of the imminent shutdown of elevator circuits and the expected high traffic load in the stairwells.
   d. An automatic announcement or tone evacuation signal shall be capable of interruption by the operation of the system microphone to give voice evacuation instructions overriding the pre-programmed sequences.
   e. Status lights next to speaker selection switches on the control panel shall indicate speaker circuit selection.
   f. Audible signals shall be silenced from the fire alarm control panel by an alarm silence switch. Visual signals shall be programmed to flash until system reset or alarm silencing, as required by the AHJ.

4. All visual synchronized notification appliances, (Xenon Strobes) shall operate throughout the protected premises, in a synchronized cadence until the system is reset.

   a. Visual signals shall be programmed to flash until system reset or alarm silencing, as required by the AHJ.

5. The activation of any smoke or sprinkler water flow initiating device sprinkler deluge panel in addition to all requirements herein specified as part of the fire alarm sequence of operations shall also cause the release of all magnetically held open or electronically locked doors in accordance with NFPA 72 and IBC requirements.

a. Coordinate with the door hardware provider and the physical access control provider for the proper connection and integration of all electronically controlled doors.

6. The alarm activation of any duct-mounted smoke sensor in addition to fire alarm sequence of operations shall initiate HVAC shut-down in accordance with NFPA 72, IMC and NFPA 90A. Exception where HVAC unit is part of the engineered smoke control system.

   a. Where an engineered smoke control system is provided the activation of any building smoke control system will be based on a signal provided to the UUKL listed Building Automation System (BAS) from the Fire Alarm System.

      1) The activation of any automatic area smoke detector, heat detector or sprinkler waterflow device will automatically cause a fire alarm relay contact closure at the appropriate Direct Digital Controller (DDC) connected to the BAS to engage and activate all mechanical smoke control operations.
      2) In addition to the above the DDC shall also provide a positive feedback signal to the fire alarm system indicating that all smoke control operations have been fully engaged. All Fire Alarm Control Panels, remote Annunciators and GUI's shall display a status indication of the current smoke control mode of operation.

   b. Coordinate with Division 23 Contractor for the proper integration of all mechanical systems associated with the operation and supervision of all HVAC and building smoke control operations.

7. Display all system activities along with time and date of occurrence on all system printers and network command center terminals where provided as part of this project.
8. System activity on the FACP shall retain the information, along with time and date of occurrence in history storage log.
9. Any alarm activation of the building fire alarm system shall immediately cause the disconnection/ disengagement of all A/V systems and bring up all house lighting in all spaces protected by a voice evacuation system.
10. All system output programs assigned via control-by-event interlock programming to be activated by the particular point in alarm shall be executed, and the associated system outputs shall be activated.
11. The alarm activation of any elevator lobby, top of shaft, elevator pit and/or machine room smoke detector shall, in addition to fire alarm sequence of operations, cause the elevator cabs to be recalled according to the following sequence in accordance with NFPA 72 and ASME 17.1 requirements:

    a. If the alarmed sensor is on any floor other than the main level of egress, the elevator cabs shall be recalled to the main level of egress.
    b. If the alarmed sensor is on the main egress level, the elevator cabs shall be recalled to the predetermined alternate recall level as determined by the local authority having jurisdiction.
    c. The alarm activation of any elevator shaft and/or machine room heat detector shall activate a "shunt trip breaker" discontinuing operation of elevator power:

d. Operating temperature for all elevator shaft and machine room heat detectors shall be rated at 135 degrees fixed temperature and shall be installed within 18" of every sprinkler head. Coordinate with sprinkler Contractor for exact quantity and location of all sprinkler heads.

12. The fire alarm system shall monitor the following alarm and supervisory conditions: PUMP RUNNING, PUMP FAIL and PHASE REVERSAL for all electric fire pumps provided as part of this project and/or PUMP RUNNING, PUMP FAIL and Low Fuel for all diesel fire pumps provided as part of this project:

    a. The Contractor shall coordinate with fire protection Contractor for the proper integration of the fire alarm system and fire pump controller in accordance with NFPA 72 and NFPA 20 requirements. Refer to fire protection drawings for exact location and number of fire pump controllers.

13. All access-controlled doors in the path of egress shall be integrated with building fire alarm in accordance with the requirements of the IBC Chapter 10, and NFPA 101 Chapter 7. Access controlled egress doors shall automatically unlock upon activation of any manual pull station, automatic smoke detector, sprinkler water flow switch or special hazard suppression system per the IBC and NFPA requirements.

14. Where permitted by the authority having jurisdiction the activation of any system smoke sensor shall initiate an Alarm Verification operation, whereby the panel will reset the activated detector and wait for a second alarm activation. If, within one (1) minute after resetting, a second alarm is reported from the same or any other smoke detector, the system shall process the alarm as described previously. If no second alarm occurs within one minute the system shall resume normal operation. The Alarm Verification shall operate only on smoke detector alarms. Other activated initiating devices shall be processed immediately. Device, zone or group of zones shall select the alarm verification operation:

    a. The control panel shall have the capability to display the number of times (tally) a zone has gone into a verification mode. Should this smoke verification tally reach a pre-programmed number, a trouble condition shall occur.
    b. Alarm verification zones shall be able to be divided into separate groups whereby only verification zones from the same group will confirm the first activation and cause the alarm sequence to activate.

15. The control panel shall have a dedicated supervisory service LED and a dedicated supervisory service acknowledge switch.

    a. The activation of any standpipe, PIV valve or sprinkler valve supervisory (tamper) switch shall activate the systems supervisory audible signal and illuminate the LED at fire alarm control panel, remote annunciators and printers. A clear differentiation between valve tamper activation and opens and/or grounds on the initiation circuit wiring shall be provided:

        1) Pressing the Supervisory Service Acknowledge Key will silence the supervisory audible signal while maintaining the Supervisory Service LED "on" indicating the off-normal condition.
        2) Restoring the valve to the normal position shall cause the Supervisory Service LED to extinguish, indicating restoration to normal.

3) All supervisory location information shall be displayed on all remote LCD annunciators, network command terminals and printers where provided as part of this project.
4) A supervisory signal shall be transmitted to an approved central monitoring station.

1.14 SYSTEM SUPERVISION

A. The system shall contain addressable inputs/outputs. The alarm activation of any initiation circuit shall not prevent the subsequent alarm operation of any other initiation circuit.

1. There shall be a supervisory initiation circuit for connection of all sprinkler supervisory valves (tamper). Device activation shall cause a supervisory alarm condition at the control panel.

a. There shall be the required number of independently supervised and independently fused notification appliance circuits for audible and visual notification devices. Disarrangement conditions of any circuit shall not affect the operation of other circuits.
b. Each independently supervised circuit shall include a discrete readout to indicate disarrangement conditions per circuit.
c. The incoming electrical power to the system shall be supervised so that any power failure must be audibly and visually indicated at the control panel. A green "power on" LED shall be displayed continuously while incoming power is present.
d. The system batteries shall be supervised so that a low battery condition or disconnection of the battery shall be audibly and visually indicated at the control panel.
e. The system modules shall be electrically supervised for module placement. Should a module become disconnected the system trouble indicator shall illuminate and the audible trouble signal shall sound.
f. The system shall have provision for disabling and enabling all circuits, and/or devices individually for maintenance or testing purposes.
g. All trouble indications in addition to above shall display all trouble location information on all remote LCD annunciators, network GUI command terminals and printers.

1.15 SYSTEM POWER REQUIREMENTS

A. All control panels, transponder panels and remote auxiliary power supplies shall receive 120 VAC emergency power via a dedicated fused disconnect circuit from the nearest emergency power distribution panel.

1. All control panels, amplifiers and remote auxiliary power supplies shall be provided with sufficient battery capacity to operate the entire system upon loss of normal 120VAC power in a normal supervisory mode for a period of twenty-four (24) hours, with fifteen (15) minutes of alarm activation available at the end of the 24-hour period.
2. The system shall automatically transfer to the standby batteries upon power failure. All battery charging, and recharging operation shall be automatic. Batteries, once discharged, shall recharge at a rate to provide a minimum of 70% capacity within 12 hours.

a. All circuits requiring system-operating power shall be 24 VDC and shall be individually fused at the control panel.
b. All control equipment must have transient protection to comply with UL864 requirements. Where Fire Alarm circuits leave the building, additional transient protection must be provided for each circuit. Devices must be UL listed under standard #497B (Isolated Loop Protectors).

1.16 ENVIRONMENTAL CONDITIONS

A. Refer to specification section 28 05 00 for addition information.

PART 2 - PRODUCTS

2.1 MANUFACTURED PRODUCTS

A. In addition to all requirements as stipulated by Specification Section 28 05 00 as well as all related specifications sections, the following shall also apply:

1. Materials and equipment furnished shall be of current production of the manufacturer and shall meet and/or exceed the specified performance and features of the equipment and/or systems as herein specified and replacement parts shall be readily available to the Contractor and/or Owner.

a. The equipment specified is based on the acceptable manufacturers listed. Where "or equal" is stated, equipment shall be equivalent in every way to that of the equipment specified, and subject to approval.

1) When more than one unit, device, or component of the same class of equipment is required, such units, devices, or components shall be the product of a single manufacturer.

2. Acceptable manufacturers for the fire alarm voice evacuation system shall be as specified and shall be provided in full compliance with the requirements of this and all related specification sections and contract drawings.

a. Where manufacturer and/or manufacturer model numbers reference specific system components in the related specification sections, it is to establish the performance requirements and quality of the systems and components only.

1) It is in no way an inference that the referenced model numbers are the manufacturer's current product and are the only manufacturer's acceptable components for this project unless specifically referenced as "no substitutions."

B. Approved Manufacturer

1. Siemens Desigo FV2050 as Maintained by Siemens
2. No Substitutions shall be accepted

C. Fire Alarm Control Panel

1. Control Panel construction shall be modular with solid state, microprocessor-based electronics. It shall display only that primary controls and displays essential to operation during a fire alarm condition. Keyboards or keypads shall not be required to operate the fire alarm control during a fire alarm condition.

a. At a minimum, the following primary controls shall be visible through a front access panel:

1) Eighty-character liquid crystal display.
2) Individual red system alarm LED.
3) Individual yellow supervisory service LED.
4) Individual yellow trouble LED.
5) Green "power on" LED.
6) Alarm Acknowledge Key.
7) Supervisory Acknowledge Key.
8) Trouble Acknowledge Key.
9) Alarm Silence Key.
10) System Reset Key.

b. The following secondary control switches shall be available behind the access panel:

1) City Box disconnect/switch (Central Station Connection)
2) Manual evacuation (drill)
3) Elevator Shunt Trip bypass
4) Spare

c. At a minimum, the control panel shall provide the following:

1) Setting of time and date.
2) Lamp Test.
3) Alarm, trouble, and abnormal condition listings.
4) Enabling and disabling of each monitor point separately.
5) Activation and deactivation of each control point separately.
6) Multiple operator access levels.
7) Walk Test enable/disable.
8) Running diagnostic functions.
9) Displaying software revision level.
10) Displaying historical logs.
11) Displaying card status.
12) Point listing.

d. For maintenance purposes, the following lists shall be available from the point lists menu:

1) All points list by address.
2) Monitor point list.
3) Auxiliary control list.
4) Scrolling through menu options or lists shall be accomplished in a self-directing manner. These controls shall be located behind an access panel.

e. Primary Keys, LED's and LCD Display:

1) The control panel shall have at the minimum a 2-line x 80-character liquid crystal display, which shall be backlit for enhanced readability. So as to conserve battery standby power, it shall not be lit during an AC power failure unless an alarm condition occurs or there is keypad activity.

2) The display shall support both upper and lower-case letters. Lowercase letters shall be used for soft key titles and prompting the user. Uppercase letters shall be used for system status information. A cursor shall be visible when entering information.

f. The control panel shall automatically perform a daily self-test on each sensor. Checking the electronics in the sensor's base ensures the accuracy of the values being transmitted to the control panel. A sensor which fails the self-test will cause a "Self-Test Abnormal" trouble condition at the control panel. Systems requiring a manually initiated self-test by an operator shall not be acceptable.

g. An operator at the control panel, having a proper access level, shall have the capability to manually access the following information for each sensor:

1) Primary status
2) Device type
3) Present average value
4) Present sensitivity selected
5) Peak detection values
6) Sensor range (normal, dirty, etc.)

h. An operator at the control panel, having a proper access level, shall have the capability to manually control the following for each sensor:

1) Clear peak detection values
2) Enable or disable the point
3) Clear verification tally
4) Control a sensor's relay driver output

i. It shall be possible to program the control panel to automatically change the sensitivity settings of each sensor based on time-of-day and day-of-week. (For example, to be more sensitive during unoccupied times and less sensitive during occupied periods.) There shall be seven sensitivity settings available for each sensor.

j. Under normal condition the front panel shall display a "System is Normal" message and the current time and date.

k. Should an abnormal condition be detected the appropriate LED (Alarm, Supervisory, or Trouble) shall flash. The panel audible signal shall pulse for alarm conditions and sound steady for trouble and supervisory conditions.

l. The LCD shall display the following information relative to the abnormal condition of a point in the system:

1) 80-character custom location label.
2) Type of device (i.e. smoke, pull station, water flow).
3) Point status (i.e. alarm, trouble).

m. Acknowledgment for each abnormal condition shall be (PER NFPA 72 Requirements):

1) Pressing the appropriate acknowledge button shall display the first unacknowledged condition in the appropriate list (either alarm, supervisory, or trouble), and require another acknowledge button. Press to acknowledge only the displayed point.

2) After all points have been acknowledged, the LCD's shall glow steady and the Sonalert will be silenced. The total number of alarms, supervisory and trouble conditions shall be displayed along with a prompt to review each list chronologically. An end of list message “END of LIST” shall indicate the end of the list.

n. Alarm Silencing:

1) Should the "Alarm Silence" button be pressed all audible alarm signals shall cease operation.

o. System Reset:

1) The SYSTEM RESET button shall be used to return the system to its normal state after an alarm condition has been remedied. The LCD display shall step the user through the reset process with simple English Language messages. Messages, "SYSTEM RESET IN PROGRESS" will first be displayed followed by the message, "SYSTEM RESET COMPLETED", and finally, "SYSTEM IS NORMAL", should all alarm conditions be cleared.

2) Should the alarm condition continue the message, "SYSTEM RESET IN PROGRESS", will be followed by the message, "SYSTEM RESET ABORTED", and the system will remain in an abnormal state. System control relays shall not reset. The Sonalert and the Alarm LED will be on. The display will indicate the total number of alarms and troubles present in the system along with a prompt to use the ACK keys to review the points. These points will not require acknowledgment if they were previously acknowledged.

p. Function Keys:

1) Additional function keys shall be provided to access status data for the following points:

a) Initiating device circuits.
b) Indicating appliance circuits.
c) Auxiliary Relays.
d) All other input/output points.

2) The following data shall be available:

a) Primary State of point
b) Zone, PID, and Card type information
c) Current priority of outputs
d) Disable/enable status
e) Verification tallies of initiating devices
f) Automatic/Manual Control Status of output points
g) Acknowledge status

q. History Logging:

1) The system shall be capable of logging and storing 300 events in an alarm log and 300 events in trouble log. These events shall be stored in a battery protected random access memory. Each recorded event shall include the time and date of that event's occurrence.

2) The following Historical Alarm Log events shall be stored:

a) Alarms
b) Alarm Acknowledgment
c) Alarm Silence
d) System Reset
e) Alarm Historical log cleared

3) The following Historical Trouble Log events shall be stored:

a) Trouble conditions
b) Supervisory Alarms
c) Trouble Acknowledgment
d) Supervisory Acknowledgment
e) Alarm Verification tallies
f) Walk Test Results
g) Trouble Historical log cleared

r. LED Supervision:

1) All slave module LED's shall be supervised for burnout or disarrangement. Should a problem occur the LCD shall display the module and LED location numbers to facilitate location of that LED.

s. System Trouble Reminder:

1) Should a trouble condition be present within the system and the audible trouble signal silenced, the trouble signal shall resound at preprogrammed time intervals to act as reminder that the fire alarm system is not 100% operational. Both the time interval and the trouble reminder signal shall be programmable to suit the Owner's application.

t. Access Levels:

1) There shall be a minimum of four (4) access levels with level 4 being the highest level. Level 1 action shall not require a pass code. Pass codes shall consist of up to ten (10) digits. Changes to pass codes shall only be made by authorized personnel.
2) In order to maintain security when entering a passcode, the digits entered will not be displayed but a cursor will move along filling the position with an x to indicate that the digit has been accepted. All key presses will be acknowledged by a local audible sound.
3) When a correct pass code is entered, the message "Access Granted" shall be displayed. The new access level shall be in effect until the operator manually logs out or the keypads have been inactive for (10) minutes.
4) Should an invalid code be input, the operator shall be notified with the message, "ERROR...INCORRECT PASS CODE", and shall be allowed up to three chances to enter a valid code. After three unsuccessful tries, the message, "ACCESS DENIED", shall be displayed. The level shall not be altered, and the operator shall no longer be in the menu option.

5) Access to a level will only allow the operator to perform all actions within that level plus all actions of lower levels, not higher levels.

6) The following keys/switches shall have access levels associated with them:

a) Alarm Silence
b) System Reset
c) Set Time/Date
d) Manual Control
e) On/Off/Auto Control
f) Disable/Enable
g) Clear Historical Alarm Log
h) Clear Historical Trouble Log
i) Walk Test
j) Change Alarm Verification

7) Acknowledge keys shall also require privileged access to acknowledge points. If the operator presses an (ACK) key with insufficient access, an error message will be displayed. The points will scroll with (ACK) key presses to view the points on the list, but the points will not get acknowledged in the database.

2. Addressable Peripheral Network

a. Communication with addressable devices:

1) The system must provide communication with initiating and control devices <u>individually</u>. All of these devices will be <u>individually</u> annunciated at the control panel. Annunciation shall include the following conditions for each point:

a) Alarm
b) Trouble
c) Open
d) Short
e) Device missing/failed
f) Device Type

b. All addressable devices shall have the capability of being disabled or enabled individually from the main fire alarm control panel and all remote annunciator panels.

c. Up to a maximum of 127 addressable devices may be multi-dropped from a single Initiating Device Circuit. Systems that do not support field reprogramming to add or delete devices are unacceptable.

d. Format:

1) The communication format must be a completely digital poll/response protocol and shall be configured as NFPA Class A wiring no t-tapping of the circuit wiring shall be accepted. A high degree of communication reliability must be obtained by using parity data bit error checking routines for address coded and check sum routines for the data transmission portion of the protocol. Systems that do not utilize full digital transmission protocol are not acceptable.

e. Identification of Addressable Devices:

1) Each addressable device must be uniquely identified by an address code entered on each device at time of installation. Systems requiring special device programming instruments are acceptable providing a spare programming instrument is provided to the Owner at no additional cost.

a) The use of jumpers to set address will not be acceptable due to the potential of vibration and poor contact. Device identification schemes that do not use uniquely set addresses but rely on electrical position along the communication channel are unacceptable. The system must verify that the proper type device is in place and matches the desired software configuration.

f. Wiring Type, Distances, Survivability, and Configurations:

1) Wiring types will be approved by the equipment manufacturer. The system shall allow at a minimum a line distance of up to 2,500 feet to the furthest addressable device on a Class A circuit. To minimize wire routing and to facilitate future additions no t-tapping of the communications channel will be accepted.

g. Alphanumeric Annunciator:

1) Provide Remote Fire Alarm Annunciator Panel(s) where indicated on drawings and/or as required by the authority having jurisdiction.

a) At the minimum, the Contractor shall provide fire alarm annunciator panels at all main building entrances, building command centers, main fire alarm control panel, and all areas as otherwise indicated by the contract drawings.

2) The remote fire alarm annunciator panel shall be a supervised, backlit LCD alphanumeric display containing a minimum of eighty (80) characters for alarm annunciation in clear English text.

3) The remote annunciator shall display all alarm and trouble conditions from either the network node or the complete network.

4) A minimum of 10 remote annunciator panels may be connected to a specific (terminal mode) EIA 485 interface. To total number remote annunciator panels shall not reduce the annunciation capacity of the system. Each LCD shall include vital system wide functions such as, system acknowledge, silence and reset.

5) LCD display annunciator shall mimic the local control panel 80-character display or network annunciator and shall not require special programming.

6) All LCD annunciators installed shall be provided with locking door or keyed enable switch. All LCD annunciators installed, as surface mounted devices shall also be mounted on a color-coordinated manufacturer's listed surface back-box.

D. Fire Fighter Control Station (FFCS)

1. The Fire Fighters Control Station located at the FACP and at remote locations where indicated on the drawings shall contain all equipment required for all audio control, alarm annunciation (FAA), signaling and supervisory functions. The FFCS shall include speaker zone controls and indication, digital voice message units and microphones. The FFCS at the minimum shall perform the following functions:

a. Operate as a supervised multi-channel (minimum 3 channels) emergency voice communication system with simultaneous broadcasting to all speaker circuits.

1) Audibly and visually annunciate the active or trouble conditions for all visual, and speaker zones.

a) Audibly and visually annunciate any trouble condition of tone generators and digital message units as required for normal operation of the system.

b) Provide all-call activities through activation of a single control switch. Operation shall activate all visual, and voice evacuation circuits.

c) Provide automatic, digitally recorded voice messages and tones which may be Field programmed through the microphone. (Contractor shall coordinate with AHJ, Owner and Architect for the proper message and required language(s) for all pre-recorded messages.)

d) Provide manual control and indication of all visual, and speaker circuits.

2) The Fire Fighter Control Stations (FFCS) shall provide all control and status interfaces to the emergency voice communication system with the capability of transmitting simultaneous prerecorded voice messages to all voice evacuation protected spaces.

3) Actuation of any alarm-initiating device shall also cause prerecorded messages to sound over voice evacuation protected spaces on the system. Speaker zoning shall be configured so that a dedicated speaker zone shall be capable of broadcasting a prerecorded evacuation message while adjacent zones spaces, and/or floor above/floor below simultaneously broadcast an alert tone and a separate and discrete emergency notification message. Each evacuation and emergency notification message shall be repeated four (4) times:

a) Prior to programming the evacuation zoning and prerecorded messages, coordinate with the Local Authority Having Jurisdiction, Owner and Architect for final programming approval.

4) The FFCS shall be provided with an integral Digital Message Generator with a capacity of up to 60 seconds. The Digital Message Generator shall be capable of simultaneous broadcasting of primary and two secondary messages (30 seconds each). These messages shall be field programmable without the use of additional equipment and shall be capable of consecutive bilingual messages. In addition, the system shall be provided with built-in alert tone generators with steady, slow whoop, high/low and chime tone and shall also be field programmable.

5) Each FFCS shall be equipped with a built-in microphone, which shall be capable of providing both All-Call and Selective paging to all speaker zones.

6) Each FFCS shall have the following voice evacuation controls and indicators to allow for proper operator control:

a) All Call LED
b) On-Line LED
c) All Call Switch
d) Selective Speaker Zone Controls
e) Local Speaker Volume Control
f) Fire Fighters Telephone Circuit Controls
g) Local (Test) Speaker

7) All speaker zone control switches shall include dedicated visual indication of active and trouble status for each speaker zone on the system and shall include dedicated selective control switches to manually activate or deactivate each speaker zone in the system.

E. Audio Amplifiers:

1. All Audio Amplifiers shall provide Audio Power at a minimum of 70 Volts (RMS) for distribution to all speaker circuits on the system and shall be fully supervised with battery back-up.

a. Audio amplifiers and tone generating equipment shall be electrically supervised for abnormal conditions and shall consist of low current, solid-state integrated circuits, with audio input, amplified output supervision and automatic switched back-up amplifiers, (if primary amplifiers should fail). Failure of any one amplifier in the system shall not degrade system performance in any way. All amplifiers shall be powered from a local dedicated primary emergency power circuit and equipped with a dedicated standby battery power:

1) All Fire Alarm system amplifiers shall be sized to provide the minimum wattage levels for each alarm speaker as indicated on the contract drawings and/or herein specified. All "Primary" and "Back-up" amplifiers shall be sized to a maximum of 75% of their rated capacity providing a minimum of 25% spare capacity for future expansion or increased power output requirements.

2) Multiple audio amplifiers may be mounted in the transponder or in the main fire alarm control panels, either to supply incremental audio power, or to function as an automatically switched backup amplifier(s).

3) The audio amplifier shall include an integral power supply, and shall provide the following controls and indicators:

a) Normal Audio Level LED
b) Incorrect Audio Level LED
c) Brownout LED
d) Battery Trouble LED
e) Amplifier Trouble LED
f) Audio Amplifier Gain Adjust

4) Adjustment of the correct audio level for the amplifier shall not require any special tools or test equipment

F. Peripheral Devices

1. Addressable Device Types:

a. General:

1) The system control panel must be capable of communicating with the types of addressable devices specified below. Addressable devices will be located as shown on the drawings. The system shall have "individual" device addressability. Each system device shall have its own address.
2) All smoke/heat sensors shall be listed to UL Standard 268 and shall be documented compatible with the control equipment to which they are connected. The sensors shall be listed for both ceiling and wall mount applications.
3) Each smoke/heat sensor base shall contain an LED that will flash each time it is scanned by the control panel (once every 4 seconds). When the control panel determines that a sensor is in an alarm or a trouble condition, the control panel shall command the LED on that sensor's base to turn on steady indicating the abnormal condition. Sensors, which do not provide a visible indication of an abnormal condition, shall not be acceptable.
4) All smoke/heat sensor bases, where shown on the plans as required, shall be provided with a relay driver and/or local sounder base output that is to be controlled either automatically or manually from the control panel.
5) Each smoke/heat Sensor shall contain a magnetically actuated test switch to provide for easy alarm testing at the sensor location.
6) All sensors shall be scanned by the control panel for its type identification to prevent inadvertent substitution of another sensor type. The control panel shall operate with the installed device but shall initiate a "Wrong Device" trouble condition until the proper type is installed or the programmed sensor type is changed.
7) All sensors' electronics shall be immune from false alarm caused by EMI and RF.

b. Addressable Pull Box (manual station):

1) Addressable pull boxes shall, on command from the control panel, send data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.
2) All operated stations shall have a positive, visual indication of operation and utilize a key type reset. Stations that utilize a special wrench or Allen key shall not be accepted.
3) Manual stations shall be constructed of Lexan with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches (44 mm) or larger. Manual stations where indicated on the contract drawings, as institutional type stations shall be UL listed for that type of application.
4) Furnish and install clear Lexan protective covers w/self-contained horn on all manual pull stations where indicated on contract drawings as "protected with wire guards". All protective covers shall be UL listed for the application.
5) All manual pull stations installed, as surface mounted devices shall be mounted on a color-coordinated manufacturer's listed surface back-box. All manual pull stations installed in locations exposed to the weather or installed in wet/damp locations shall be listed for that application and mounted on manufacturer's back-box listed for weatherproof applications.

c. Intelligent Photoelectric Smoke Detector:

1) The intelligent smoke detectors shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.
2) Furnish and install wire guards on all smoke detectors, where indicated on contract drawings. All wire guards shall be UL listed for the application.

d. Intelligent Duct Smoke Detectors:

1) The intelligent duct smoke detectors shall be photoelectric and listed by Underwriters' Laboratories, Inc. Each smoke sensor and air duct housing shall be self-compensating for the effects of air velocity (from 300 to 4,000 FM), temperature, humidity and atmospheric pressure. It shall not be necessary to field adjust the sensitivity to compensate for the above effects. Each smoke sensor shall utilize solid state components and be equipped with an integral alarm indicating LED, which shall flash when the smoke sensor is activated.

a) In addition, each duct smoke detector shall be equipped with a programmable form "C" remote relay with contacts rated at 3 AMPS, 120 VAC resistive or 24 VDC resistive and wired for fan shut down requirements and or other related smoke control functions as required by code.

2) Duct smoke detectors shall be capable of a programming format that permits a supervisory signal to be transmitted to the fire alarm control panel while providing a latched relay state on the fan control interface until reset of the fire alarm control panel.

3) Each duct-smoke detector shall be provided with a remote test station and remote alarm-indicating lamp in accordance with all requirements of NFPA 72. All remote test stations shall be key operated and shall be installed at 5 feet above finished floor. Remote indicating lamps can be integral to the remote test or can be stand-alone devices. Remote indicating lamps that are stand-alone devices shall be listed for use with the duct smoke detector and can be mounted on wall or ceilings.

a) Duct-smoke detectors shall be provided and wired by the Division 26 Contractor and installed by the Division 23 Contractor. Refer to Division 23 documents for additional information regarding location and quantities of detectors.

e. Weather Proof Duct Smoke Detectors

1) Provide weather proof duct detectors at all locations at roof top Air Handler Units where supply/return air ducts penetrate roof and insufficient space is available below roof to install duct detectors in accordance with NFPA 72 and IBC Mechanical Code.

a) The weather proof duct smoke detectors shall be photoelectric and listed by Underwriters' Laboratories, Inc for exterior environments from 32 F to 155 F at a relative humidity of 10% to 85% condensation. Each smoke sensor shall be self-compensating for the effects of air velocity (from 100 to 4,000 FM). Each smoke sensor shall utilize solid state components and be equipped with an integral alarm indicating LED, which shall flash when the smoke sensor is activated.

b) In addition, each duct smoke detector shall be equipped with 2 sets of form C Alarm contacts rated at 10A and 1 set of form C Trouble contacts rated at 10A. The duct smoke detector shall be wired to an addressable monitor module which shall provide all alarm and trouble indications to the main fire alarm control panel. All fan shut functions shall be accomplished by the installation of a dedicated addressable control module. Smoke detector shall be model SSU-SL02000-P or approved equal.

c) Duct smoke detector housing shall be a NEMA 3R weather proof enclosure UL listed for that application. The duct-smoke detector housing shall be provided integral heater listed for use with duct detector housing and required air sampling tubes sized for the application. The integral heater kit shall be module OP-001 as manufactured by Space Age Electronics. The weather proof duct detector housing shall be model SSU-WP-2000 as manufactured by Space Age Electronics or approved equal.

2) All Duct-smoke detectors shall be provided and wired by the Division 26 Contractor and installed by the Division 23 Contractor. Refer to Division 23 documents for additional information regarding location and quantities of detectors.

f. Intelligent Thermal Detectors:

1) Thermal detectors where indicated on the drawings shall be intelligent addressable devices rated at 135 degrees Fahrenheit (58 degrees Celsius) and have a rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. It shall connect via two wires to the fire alarm control panel signaling line circuit.
2) Furnish and install wire guards on all heat detectors, where indicated on contract drawings. All wire guards shall be UL listed for the application.

g. Conventional Thermal Detectors:

1) Thermal detectors were indicated as conventional detectors on the drawings shall be rated at 135 degrees Fahrenheit (58 degrees Celsius) and have a rate-of-rise element rated at 15 degrees F per minute. It shall connect via an addressable zone module to the fire alarm control panel signaling line circuit. Maximum number of devices permitted any single IDC circuit shall be 15 devices per addressable zone module and shall be provided in only areas indicated by the contract documents or identified as zoned conventional devices on the fire alarm riser diagram.
2) Thermal detectors were indicated as conventional detectors fixed temperature on the drawings shall be rated at 194 degrees Fahrenheit. It shall connect via an addressable zone module to the fire alarm control panel signaling line circuit. Maximum number of devices permitted on any single IDC circuit shall be 15 devices per addressable zone module and shall be provided in only areas indicated by the contract documents or identified as zoned conventional devices on the fire alarm riser diagram.

h. Addressable Dry Contact Monitor Module:

1) Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices such as sprinkler water flow switches, pressure switches, sprinkler control valves and conventional heat detectors and/or any N.O. dry contact device to fire alarm system SLCs.
2) The monitor module shall mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box.
3) The IDC zone shall be suitable for Style D or Style B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.
4) For difficult to reach areas, the monitor module shall be available in a miniature package and shall be no larger than 2-3/4-inch (70 mm) x 1-1/4-inch (31.7 mm) x 1/2 inch (12.7 mm). This version need not include Style D or an LED.

i. Two Wire Detector Monitor Module:

1) Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device).
2) The two-wire monitor module shall mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box or with an optional surface back-box.
3) The IDC zone may be wired for Class A operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

j. Addressable Control Module:

1) Addressable control modules shall be provided to supervise and control the operation of conventional NACs of compatible, 24 VDC polarized audio/visual notification appliances and/or fan shutdown and other auxiliary control functions, in which case the control module shall be configured to operate as a dry contract relay.
2) The control module shall mount in a standard 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box, or to a surface mounted back-box.
3) The control module NAC may be wired for Class A with up to 1 amp of inductive A/V signal, or 2 amps of resistive A/V signal operation, or as a dry contact (Form-C) relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to ensure that 100% of all auxiliary relay or NACs may be energized at the same time on the same pair of wires.

a) A separate supervised power circuit from the main fire alarm control panel or from a supervised shall provide Audio/visual power, UL listed remote power supply.
b) The control module shall be suitable for pilot duty applications and rated for a minimum of 0.6 amps at 30 VDC.

k. Batteries:

1) The batteries shall be sealed Gel Cell type, 12-volt nominal.

2) The battery shall have sufficient capacity to power the complete fire alarm system and all ancillary control units in their entirety for not less than 24 hours plus fifteen minutes of continuous operation of all system notification appliances upon any loss of normal AC power.

l. Combination Speaker/Strobe Assembly (Ceiling/Wall Mounted):

1) Furnish and install where indicated on drawings combination "synchronized" 70 Volt (RMS) multi-tap speaker/strobe audio/visual notification appliances (White in Color). The horn unit shall produce a minimum sound pressure level of 88db at 10 feet and shall be UL listed for fire alarm use. The strobe lens shall be clear, and the housing engraved, "FIRE". The Contractor shall be responsible for providing the required candela rating for each strobe light based on the device location in accordance with all requirements of NFPA 72 and UL 1971.
2) Furnish and install wire guards on all Horn/Strobe units, where indicated on contract drawings. All wire guards shall be UL listed for the application.
3) All horn/strobe devices installed, as surface mounted devices shall be mounted on a color-coordinated manufacturer's listed surface backbox. All horn/strobe devices installed in locations exposed to the weather or installed in wet/damp locations shall be listed for that application and mounted on manufacturer's backbox listed for weatherproof applications.

m. Trumpet Horn Unit Assembly:

1) Furnish and install where indicated on drawings 70 VMS trumpet horn notification appliances (White in Color). The horn unit shall produce a minimum sound pressure level of 88db at 10 feet and shall be UL listed for fire alarm use.
2) Furnish and install wire guards on all Horn units, where indicated on contract drawings.
3) All horn devices installed, as surface mounted devices shall be mounted on a color-coordinated manufacturer's listed surface backbox. All horn devices installed in locations exposed to the weather or installed in wet/damp locations shall be listed for that application and mounted on manufacturer's backbox listed for weather proof applications.

n. Speaker Taps

1) Wall Mounted Speakers - Offices/Common Areas – 1 Watt
2) Wall Mounted Speakers - Corridor/Stair Towers – 1/2 Watt
3) Ceiling Mounted Speakers Offices/Common Areas – 1 Watt
4) Ceiling Mounted Speakers - Corridors – 1/2 Watt
5) Trumpet Speakers – Mechanical, Electrical, Baggage Handling Spaces – 15 Watts

o. Visual Flashing Strobe (Ceiling/Wall Mounted):

1) Furnish and install where indicated on drawings "synchronized" strobe notification appliances (White in Color) installed as either flush ceiling or wall mounted units in accordance with the Contract Drawings. The strobe lens shall be clear, and the housing engraved, "FIRE". The Contractor shall be responsible for providing the required candela rating for each strobe light based on the device location in accordance with all requirements of NFPA 72 and UL 1971.
2) Furnish and install wire guards on all Strobe units, where indicated on contract drawings.

3) All strobe devices installed, as surface mounted devices shall be mounted on a color-coordinated manufacturer's listed surface back-box. All strobe devices installed in locations exposed to the weather or installed in wet/damp locations shall be listed for that application and mounted on manufacturer's back-box listed for weatherproof applications.

4) Proper installation and spacing shall be in accordance with all NFPA 72 requirements and manufacturers recommendations. In addition to the locations indicated on the contract documents the Contractor shall be responsible for determining exact placement of all devices and shall locate and install all devices based on NFPA 72 requirements for visual candela ratings and shall be coordinated with Architectural drawings.

PART 3 - EXECUTION

3.1 COORDINATION

A. Coordinate the installation of all fire alarm components, equipment, devices, cabling, conduits and related appurtenances, with the applicable trades to ensure proper connectivity, functions and/or system integrations in accordance with all related specification sections. Refer to Division 01 Specification Section for additional project coordination requirements.

1. Coordinate with all trades at the time of shop drawing submission detailing all conditions impacting the installation of all components, equipment, devices, cabling, conduits and related appurtenances. The Contractor shall coordinate with the appropriate trade all conditions impacting the installation any system, conduit, or cable tray including but not limited all communications rooms, equipment locations, site conditions, and above ceiling spaces, to the satisfaction of all concerned trades, subject to final review by the Owner and OAR.

B. In addition to all requirements as stipulated by Specification Section 28 05 00 as well as all related specifications sections, the following shall also apply:

1. The Contractor shall coordinate with the appropriate trade all conditions impacting the installation of fire alarm, as well as all appurtenances and/or system integrations including but not limited to all equipment locations, ceilings, lighting fixtures, fire protection piping, and ductwork layouts to the satisfaction of all concerned trades, subject to final review by the Owner and OAR.

a. Coordinate exact location of all desktop/counter/wall mounted equipment with the Owner and OAR, as well as all affected trades and tenants prior to the installation of any fire alarm system panels, controls, annunciators and all appurtenances.

b. Coordinate exact location(s) of all fire alarm system panels, controls, annunciators, as well as all appurtenances, conductors, conduits, equipment, and/or devices with all architectural plans, reflected ceiling plans and affected trades prior to installation.

c. All fire alarm system controls, panels, annunciators and/or devices as well as all appurtenance installations requiring coordination with other trades the Contractor shall provide all templates, backboxes and equipment anchor bolts for mounting or flush mounting preparation, (e.g. pedestals or other devices requiring mounting on walls, concrete pads or other materials). Coordinate delivery of templates and equipment anchor bolts to preclude any delay in the construction schedule or the work of the affected trade.

d. If installation of any fire alarm conductors, conduits, controls, panels, annunciators’ devices and/or appurtenances is performed prior to coordination with other trades, which interferes with work of other trades or operation and maintenance of the facility, make necessary changes to correct the condition at no additional cost to the Owner.

2. Coordinate the installation of all fire alarm components, equipment, devices, cabling, conduits and related appurtenances, with the applicable trades to ensure proper connectivity, functions and/or system integrations in accordance with all related specification sections. Refer to Division 01 Specification Section for additional project coordination requirements.

3. Coordinate with all trades at the time of shop drawing submission detailing all conditions impacting the installation of all components, equipment, devices, cabling, conduits and related appurtenances. The Contractor shall coordinate with the appropriate trade all conditions impacting the installation any system, conduit, or cable tray including but not limited all communications rooms, equipment locations, site conditions, and above ceiling spaces, to the satisfaction of all concerned trades, subject to final review by the Owner and OAR.

C. Pre-installation Conference: Attend all pre-installation conferences at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to the proper installation of the fire alarm system, including, but not limited to, the following:

1. Inspect and discuss electrical and control system roughing-in related to installation of the fire alarm system as well as all preparatory work as required to be performed by other trades related to the seamless integration of the following systems;

   a. Wet and Dry Pipe Sprinkler Systems
   b. Deluge Sprinkler Systems
   c. Kitchen Suppression Systems
   d. HVAC Shutdown
   e. Building Management System (BMS)
   f. Automatic Smoke Doors
   g. Elevator Phase I Fire Fighters Operations
   h. Access-Controlled Egress Doors
   i. Siemens Graphic Computers

2. Review all sequence of operations related to the integration of the fire alarm system, building smoke control, deluge and pre-action sprinkler systems.
3. Review and finalize construction schedule, project phasing and availability of materials, installation personnel, equipment, and any preparatory work by other trades needed to make progress and avoid delays.
4. Review required start-up, testing, commissioning and certifying procedures to be employed for the fire alarm system and any impacts to other trades.

D. The Contractor shall maintain a complete set of current and up to date shop drawings and equipment submissions at the job site at all times. Shop drawings, equipment submissions and all other documents submitted for review shall be made available on site to the Owner and OAR upon request.

1. Coordinate any work scheduled to be provided by Owner or Owner's Vender that impact the scope of work associated with integration of the fire alarm system according to all requirements of this project. Schedule all work to ensure that the work of the Owner and all Owner Vendors can proceed in accordance with the Project Schedule.

3.2 EQUIPMENT PROTECTION

A. Refer to specification section 28 05 00 for additional information.

3.3 WORK PERFORMANCE

A. In addition to all requirements as stipulated by Specification Section 28 05 00 as well as all related specifications sections, the following shall also apply:

1. Installation, final termination, and testing, of all fire alarm system and all related components, equipment, devices, cabling, conduits and related appurtenances shall be under the direct supervision of the appropriate system integrator. The integrator shall be an accredited and authorized distributor of the appropriate equipment manufacturer and shall be fully certified in the installation, testing, and commissioning, of all elements of the fire alarm system being provided as part of this project.

B. Job site safety and worker safety is the responsibility of the Contractor. Ensure that safe access and egress from all work areas is maintained during movement and installation of materials. Clean up all debris generated by installation activities. Keep all areas free of debris at all times.

C. For work on existing facilities, arrange, phase, and perform work to assure the operation of all systems for other buildings and contiguous spaces at all times. Refer to Division 01 Specification Section for additional requirements.

D. Remove all unnecessary tools and equipment, unused materials, packing materials, and debris from each area where work has been completed unless designated for storage.

E. The Contractor shall prepare the necessary documents required for installing, testing, and bringing each system online. Such documents include but are not limited to:

1. Project management and quality assurance plans
2. Testing plans
3. Component and system submittal documents
4. Installation plans
5. Component design plans
6. System user documentation
7. Record Drawings and documentation

3.4 INSTALLATION

A. In addition to all requirements as specified by specification section 28 05 00 the fire alarm system shall also be provided in accordance with the following requirements:

1. All fire alarm system wiring shall be installed in strict compliance with all the provisions of NEC-Article 760 A and C, Power-Limited Fire Protective Signaling Circuits or if required may be reclassified as non-power limited and wired in accordance with NEC-Article 760. Upon completion, the Contractor shall so certify in writing to the Architect of such compliance.
    a. All fire alarm system wiring shall be installed in dedicated conduits or raceways. Refer to specification Section 28 05 00 and related Division 26 specification sections for additional information.
    b. The Contractor shall clean all dirt and debris from the inside and the outside of the fire alarm equipment after completion of the installation.

B. Penetrations of Walls and Floors:
    1. Refer to specification Section 28 05 00 for additional information.

3.5 ELECTRICAL POWER DISTRIBUTION

A. Refer to specification Section 28 05 00 for additional information.

3.6 TRANSIENT VOLTAGE SUPPRESSION

A. Refer to specification Section 28 05 00 for additional information.

3.7 GROUNDING AND BONDING

A. Refer to specification Section 28 05 00 for all project grounding and bonding requirements.

3.8 EQUIPMENT IDENTIFICATION

A. In addition to all requirements as stipulated by Division 01 refer to related specification Section 27 0553 for all labeling and identification requirements.

3.9 MAINTENANCE AND SERVICE

A. General Requirements
    1. In addition to all associated requirements of 28 05 00 the following shall also apply.
    2. After formal written acceptance of all fire alarm system components, equipment, devices, cabling, conduits and related appurtenances, the Contractor shall provide all services required to maintain the system in fully operational state for the warranty period as specified by Division 01 as well as all related specification sections
        a. Provide all necessary labor, materials and related appurtenances as required for performing scheduled adjustments or other non-scheduled work. Impacts on facility operations shall be minimized when performing scheduled adjustments or other non-scheduled work related to the installation and termination of all backbone and riser infrastructures. Refer to Division 01 specification section for additional requirements.

3.10 WARRANTY

A. Warrant material and workmanship for a period as specified in Division 01 of the contract documents as well as all requirements of specification section 28 05 00, related specification sections and as well as herein specified. The warranty period shall commence from the date the Contactor received written notification of final acceptance from the Owner and/or OAR. At the minimum, the Contractor shall provide the following warranty provisions:

1. Warrant the replacement of all defective equipment, materials, components, or systems components/materials and/or correct all defective work when given notice by the Owner and OAR during the warranty period.

   a. At no time is the Contractor to use the extra materials provided under the scope of this project to replace malfunctioning or damaged equipment, material, components, or systems. The Contractor shall replace all malfunctioning or damaged equipment and or components with new.

      1) The repair and then reinstallation of malfunctioning or damaged equipment shall not be acceptable.

   b. During the Warranty period, replace failed materials, components or workmanship per the terms specified in this section as well as Division 01, 28 05 00 and any related specification sections. The Owner and OAR shall not be bound to the terms and conditions of the manufacturer's warranty, pertaining to the replacement of failed equipment. In any situation, it is the Vendor's responsibility to keep the system operational during any hardware or software failures. Replacement equipment shall be provided to maintain operations while equipment manufacturer addresses warranty issues.

      1) Warranty replacements and repairs shall include any necessary shipping, handling and materials.

2. Warranty excludes liability for consequential incidental, or special damages due to vandalism, misuse, or acts of god.
3. Onsite warranty response time by qualified technician shall be no more than 8 hours upon receipt of request from Owner, unless otherwise noted in related Division 27 specification sections.
4. Warranty repairs shall be provided to the Owner at no cost. This shall include but not limited to replacement of all defective components/materials, all labor charges, all travel costs and all vehicle charges.
5. Response time shall be 7 days a week / 24 hour a day / 365 day a Year.
6. Provide test, inspection, and service of each system on a semi-annual basis at six-month intervals.
7. Contractor must provide verification that they maintain their principle base of operation along with the personnel that will be responsible for providing service within 3 hours driving time to the project site. This tenet shall remain in effect for the life of the warranty.

B. The Contractor shall, as a condition of final payment, execute a written warranty certifying all fire alarm system components, equipment, devices, cabling, conduits and related appurtenances have been completed in accordance with all requirements of the Contract Documents.

1. All system testing, commissioning and demonstration shall be performed prior to final system acceptance. All defects or damages due to faulty materials or workmanship shall be replaced without delay, to the satisfaction of the Owner’s Representative, at the Contractor's expense.
   a. The Contractor shall provide written documentation of all test results and stating what was done to correct any deficiencies. The first inspection shall occur 90 calendar days after the acceptance date. The last inspection shall occur 30 calendar days prior to the end of the warranty.
   b. The warranty period shall be extended until the last inspection and associated corrective actions are complete. Where any equipment and/or labor covered by Contractor's or manufacturer's warranty, has been replaced, due to failure, the warranty period for any replaced equipment or restored work shall be reinstated for a period equal to the original warranty period, and commencing with the date of completion of the replacement or restoration work.

3.11 FIELD SERVICES

A. In addition to all testing requirements as specified by Division 01, specification 28 05 00 as well as all related Division 27 Specification Sections, testing of all fire alarm components, equipment, devices, cabling, conduits and related appurtenances shall be provided in accordance with the following requirements;

1. Notify the Owner and OAR in writing, prior to the closing of any ceilings and ten (10) days advance of testing all backbone and riser infrastructures to prevent delays in construction schedules.
2. Test all grounding, bonding, surge suppression, initiating, audio and network circuits prior to start-up and commissioning of any, fire alarm system components, equipment, devices, cabling, ancillary system integrations and all related appurtenances.

B. Contractor Requirements

1. Contractor shall provide sufficient skilled labor to complete testing within a reasonable test period.
2. Contractor shall have a minimum of three years’ experience installing and testing structured fire alarm systems. All installers assigned by the Contractor to the installation shall be certified by the factory to install and test the provided products.
3. Contractor is responsible for supplying all of required test equipment necessary to perform all acceptance testing in accordance with all requirements of the Contract Documents.
4. Contractor is responsible for submitting complete acceptance documentation as defined as herein specified. No fire alarm installations shall be considered complete until all test results have been completed, submitted and approved by Owner and OAR.

C. Before requesting a final inspection, the Contractor shall perform a series of end to end installation performance tests. The Contractor shall submit for approval by the Owner and OAR all test procedures to be employed, test result forms, and timetable for testing all system components, equipment, devices, cabling, and related appurtenances connections.

D. Acceptance of the test procedures is predicated on the Contractor's use of the specified products.

1. The fire alarm system shall be furnished and installed as herein specified as well as all related specification sections. All fire alarm components, equipment, devices, cabling, conduits and related appurtenances shall be installed in accordance will the Contract documents, as well as all manufacturer's recommended practices, applicable codes, standards and industry practices.

2. Acceptance of the completed installation for each system will be evaluated in accordance with the following factors;

a. Phases of Testing:

1) On-Site Performance Verification Testing
2) On-Site Final Acceptance Testing.

E. Testing:

1. In addition to all requirements as specified by Specification Section 28 05 00 the fire alarm system shall also comply with the following requirements:

a. The completed fire alarm system shall be fully tested in accordance with all NFPA 72 testing and certification requirements.

1) Upon completion of a successful testing, the Contractor shall so certify in writing to the Owner and OAR all testing was completed, certified and left in first class operational condition, the Contractor shall submit to the Owner and OAR for review all completed NFPA 72 certification, calibration and test reports witnessed and signed by the AHJ prior to final acceptance.

a) In addition, the Contractor shall provide to the Owner and OAR written documentation of all testing, cleaning, <u>threshold settings</u>, and <u>sensitivity readings</u> for each automatic smoke-sensing device within the system.

b. The service of a competent, factory-trained engineer or NICET Level III technician authorized by the equipment manufacturer and licensed by the state shall be provided to technically supervise installation and participate during initial system start-up, final testing and assist the Authority Having Jurisdiction during final acceptance testing.

F. Demonstrations

1. In addition to all requirements of Division 01 and Specification Section 28 05 00 the fire alarm system shall also comply with the following requirements:

a. At the final inspection, a factory-trained representative of the equipment manufacturer shall demonstrate to the Owner and Architect that the system functions properly in every respect and is in full compliance with the contract documents. This requirement is in addition, to all testing requirements listed in specification section 28 05 00 and related specification sections.

1) The Contractor shall provide a typewritten framed "Sequence of Operation." Posted at the main fire alarm control panel and at all remote annunciator panel locations.

2) Provide written notification to the Owner and Architect of the systems condition before and after service, exact components that were tested, detector sensitivity readings, battery conditions and overall status of the system.

3.12 TRAINING

A. In addition to all requirements of Division 01, Specification section 28 05 00 and all related specification sections the following shall apply;

1. At the minimum review of functional and operations changes to the existing Siemens platform. Coordinate with Owner in advance all review dates and schedules to allow Owner to have all selected personnel in attendance.

3.13 PROJECT CLOSEOUT REQUIREMENTS

A. In addition to all final close requirements as specified by Division 01, Specification Section 28 05 00 Specification Section, the Contractor shall comply with all requirements of this Section.

B. Final System Acceptance

1. In addition to the requirements set forth in Division 01, the Contractor shall prepare and issue a Certificate of Project Completion, containing:

   a. The date of project completion.
   b. A list of items that have been corrected by the Contractor.
   c. Date final acceptance was provided to the Contractor by Owner and OAR
   d. The time and date the Owner will assume possession of the system (transfer of ownership).
   e. The date that warranty begins.

2. The Owner and OAR will perform an inspection after receipt of written certification. The project completion inspection shall include, but not be limited to:

   a. The project's contracted work and any additional change orders.
   b. All equipment and systems tested and shown operational in the presence of the Owner and OAR.

3. After the inspection, the Owner and OAR will prepare and submit to the Contractor, a list of items to be completed or corrected, as determined by the inspection, along with the designated timeframe for completion.

4. Should the Owner or OAR consider the work not to be complete, the Owner or OAR will immediately notify the Contractor, in writing, stating the reasons. The Contractor shall complete the work, and then send a second written notice to the Owner and OAR certifying that the Project is complete. The Owner and OAR shall then re-inspect the work upon Contractor's request at a scheduled re-inspection time.

   a. At any time, the Owner shall have the right to Contract with a third-party necessary to complete and/or inspect any work of which Contractor failed to meet the Contract requirements. All costs for this third party shall be borne by the original Contractor responsible for delivering the project.

C. Inspections

1. In addition to all requirements of Division 01 and Specification Section 28 05 00 the fire alarm system shall also comply with the following requirements:

   a. At the completion of the project and prior to final acceptance of the Work, provide evidence to the Owner and OAR of all final tests, inspections, certifications and approvals of the Authorities Having Jurisdiction.

2. Owner approval is required prior to final system acceptance and payment.

END OF SECTION

SECTION 31 31 16 - TERMITE CONTROL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and General conditions provisions of the contract including contractual conditions, and division 1 specifications.

1.2 SUMMARY

A. This Section includes the following for termite control:

1. Soil treatment.

1.3 DEFINITIONS

A. EPA: Environmental Protection Agency.

B. PCO: Pest control operator.

1.4 SUBMITTALS

A. (SD-01) Product Data: Treatments and application instructions, including EPA-Registered Label.

B. (SD-13) Product Certificates: Signed by manufacturers of termite control products certifying that treatments furnished comply with requirements.

C. (SD-09) Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

D. (SD-12) Soil Treatment Application Report: After application of termiticide is completed, submit report for Owner's record information, including the following as applicable:

1. Date and time of application.
2. Moisture content of soil before application.
3. Brand name and manufacturer of termiticide.
4. Quantity of undiluted termiticide used.
5. Dilutions, methods, volumes, and rates of application used.

6. Areas of application.
7. Water source for application.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: A pest control operator who is licensed according to regulations of authorities having jurisdiction to apply termite control treatment in jurisdiction where Project is located.

B. Regulatory Requirements: Formulate and apply termiticides, and label with a Federal registration number, to comply with EPA regulations and authorities having jurisdiction.

C. Independent Testing: Independent testing laboratory shall certify that treatment meets the requirements.

1.6 PROJECT CONDITIONS

A. Environmental Limitations: To ensure penetration, do not treat soil that is water saturated. Do not treat soil while precipitation is occurring. Comply with EPA-Registered Label requirements and requirements of authorities having jurisdiction.

1.7 COORDINATION

A. Coordinate soil treatment application with excavating, filling, and grading and concreting operations. Treat soil under footings, grade beams, and ground-supported slabs, before construction.

1.8 WARRANTY

A. Special Warranty: Written warranty, signed by applicator and Contractor certifying that termite control work, consisting of applied soil termiticide treatment, will prevent infestation of subterranean termites. If subterranean termite activity or damage is discovered during warranty period, re-treat soil and repair or replace damage caused by termite infestation.

1. Warranty Period: Five years from date of Substantial Completion.

a. Provide optional renewal on the same terms.

B. Should damage occur during the guarantee period, the Contractor shall make repairs to structurally damaged surfaces to a dollar value based on the size of the building.

1.9 MAINTENANCE SERVICE

A. Continuing Service: Provide a proposal for continuing service, including monitoring, inspection, and re-treatment for occurrences of termite activity, from applicator to Owner, in the form of a standard continuing service agreement, starting on the date of

Substantial Completion. State services, obligations, conditions, and terms for agreement period and for future renewal options.

PART 2 - PRODUCTS

2.1 SOIL TREATMENT

A. Termiticide: Provide an EPA-registered termiticide complying with requirements of authorities having jurisdiction, in a soluble or emulsible, concentrated formulation that dilutes with water or foaming agent, and formulated to prevent termite infestation. Use only soil treatment solutions that are not harmful to plants. Provide quantity required for application at the label volume and rate for the maximum termiticide concentration allowed for each specific use, according to the product's EPA-Registered Label.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Applicator present, for compliance with requirements for moisture content of the soil, interfaces with earthwork, slab and foundation work, landscaping, and other conditions affecting performance of termite control. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's written instructions for preparing substrate.

1. Remove all extraneous sources of wood cellulose and other edible materials such as wood debris, tree stumps and roots, stakes, formwork, and construction waste wood from soil and around foundations.

B. Soil Treatment Preparation: Remove foreign matter and impermeable soil materials that could decrease treatment effectiveness on areas to be treated. Loosen, rake, and level soil to be treated, except previously compacted areas under slabs and footings.

1. Termiticides may be applied before placing compacted fill under slabs if recommended by termiticide manufacturer.

3.3 APPLICATION, GENERAL

A. General: Comply with the most stringent requirements of authorities having jurisdiction and with manufacturer's EPA-Registered Label for products.

3.4 APPLYING SOIL TREATMENT

A. Application: Mix soil treatment termiticide solution to a uniform consistency. Provide quantity required for application at the label volume and rate for the maximum specified concentration of termiticide, according to manufacturer's EPA-Registered Label, to the following so that a continuous horizontal and vertical termiticidal barrier or treated zone is established around and under building construction. Distribute the treatment evenly.

1. Slabs-on-Grade: Under ground-supported slab construction, including footings, building slabs, and attached slabs as an overall treatment. Treat soil materials before concrete footings and slabs are placed.
2. Foundations: Adjacent soil including soil along entire inside perimeter of foundation walls, along both sides of interior partition walls, around plumbing pipes and electric conduit penetrating slab, and around interior column footers, piers, and chimney bases; and along entire outside perimeter, from grade to bottom of footing. Avoid soil washout around footings.
3. Masonry: Treat voids.
4. Penetrations: At expansion joints, control joints, and areas where slabs will be penetrated.

B. Avoid disturbance of treated soil after application. Keep off treated areas until completely dry.

C. Protect termiticide solution, dispersed in treated soils and fills, from being diluted until ground-supported slabs are installed. Use waterproof barrier according to EPA-Registered Label instructions.

D. Post warning signs in areas of application.

E. Reapply soil treatment solution to areas disturbed by subsequent excavation, grading, landscaping, or other construction activities following application.

END OF SECTION 31 31 16

Section (32 13 13) Item P-610

Concrete for Miscellaneous Structures

DESCRIPTION

610-1.1 This item shall consist of concrete and reinforcement, as shown on the plans, prepared and constructed in accordance with these specifications. This specification shall be used for all concrete other than airfield pavement which are cast-in-place.

MATERIALS

610-2.1 General. Only approved materials, conforming to the requirements of these specifications, shall be used in the work. Materials may be subject to inspection and tests at any time during their preparation or use. The source of all materials shall be approved by the Resident Project Representative (RPR) before delivery or use in the work. Representative preliminary samples of the materials shall be submitted by the Contractor, when required, for examination and test. Materials shall be stored and handled to ensure preservation of their quality and fitness for use and shall be located to facilitate prompt inspection. All equipment for handling and transporting materials and concrete must be clean before any material or concrete is placed in them.

The use of pit-run aggregates shall not be permitted unless the pit-run aggregate has been screened and washed, and all fine and coarse aggregates stored separately and kept clean. The mixing of different aggregates from different sources in one storage stockpile or alternating batches of different aggregates shall not be permitted.

a. Reactivity. Fine aggregate and coarse aggregates to be used in all concrete shall have been tested separately within six months of the project in accordance with ASTM C1260. Test results shall be submitted to the RPR. The aggregate shall be considered innocuous if the expansion of test specimens, tested in accordance with ASTM C1260, does not exceed 0.08% at 14 days. If the expansion either or both test specimen is greater than 0.08% at 14 days, but less than 0.20%, a minimum of 25% of Type F fly ash, or between 40% and 55% of slag cement shall be used in the concrete mix.

If the expansion is greater than 0.20%, the aggregates shall not be used, and test results for other aggregates must be submitted for evaluation; or aggregates that meet P-501 reactivity test requirements may be utilized.

610-2.2 Coarse aggregate. The coarse aggregate for concrete shall meet the requirements of ASTM C33 and the requirements of Table 4, Class Designation 5S; and the grading requirements shown below, as required for the project.

Coarse Aggregate Grading Requirements

Maximum Aggregate Size	ASTM C33, Table 3 Grading Requirements (Size No.)
1 1/2 inch	467 or 4 and 67
1 inch	57
¾ inch	67
½ inch	7

610-2.2.1 Coarse Aggregate susceptibility to durability (D) cracking. Not used.

610-2.3 Fine aggregate. The fine aggregate for concrete shall meet all fine aggregate requirements of ASTM C33.

610-2.4 Cement. Cement shall conform to the requirements of **ASTM C150** Type **I or II**.

610-2.5 Cementitious materials.

a. Fly ash. Fly ash shall meet the requirements of ASTM C618, with the exception of loss of ignition, where the maximum shall be less than 6%. Fly ash shall have a Calcium Oxide (CaO) content of less than **[** 15% **]** and a total available alkali content less than 3% per ASTM C311. Fly ash produced in furnace operations using liming materials or soda ash (sodium carbonate) as an additive shall not be acceptable. The Contractor shall furnish the previous three most recent, consecutive ASTM C618 reports for each source of fly ash proposed in the concrete mix, and shall furnish each additional report as they become available during the project. The reports can be used for acceptance or the material may be tested independently by the RPR.

b. Slag cement (ground granulated blast furnace (GGBF)). Slag cement shall conform to ASTM C989, Grade 100 or Grade 120. Slag cement shall be used only at a rate between 25% and 55% of the total cementitious material by mass.

610-2.6 Water. Water used in mixing or curing shall be from potable water sources. Other sources shall be tested in accordance with ASTM C1602 prior to use.

610-2.7 Admixtures. The Contractor shall submit certificates indicating that the material to be furnished meets all of the requirements indicated below. In addition, the RPR may require the Contractor to submit complete test data from an approved laboratory showing that the material to be furnished meets all of the requirements of the cited specifications. Subsequent tests may be made of samples taken by the RPR from the supply of the material being furnished or proposed for use on the work to determine whether the admixture is uniform in quality with that approved.

a. Air-entraining admixtures. Air-entraining admixtures shall meet the requirements of ASTM C260 and shall consistently entrain the air content in the specified ranges under field conditions. The air-entrainment agent and any water reducer admixture shall be compatible.

b. Water-reducing admixtures. Water-reducing admixture shall meet the requirements of ASTM C494, Type A, B, or D. ASTM C494, Type F and G high range water reducing admixtures and ASTM C1017 flowable admixtures shall not be used.

c. Other chemical admixtures. The use of set retarding, and set-accelerating admixtures shall be approved by the RPR. Retarding shall meet the requirements of ASTM C494, Type A, B, or D and set-accelerating shall meet the requirements of ASTM C494, Type C. Calcium chloride and admixtures containing calcium chloride shall not be used.

610-2.8 Premolded joint material. Premolded joint material for expansion joints shall meet the requirements of ASTM D1751 or ASTM D1752**.**

610-2.9 Joint filler. The filler for joints shall meet the requirements of Item P-605, unless otherwise specified.

610-2.10 Steel reinforcement. Reinforcing shall conform to one of the following requirements:

Steel Reinforcement

Reinforcing Steel	**ASTM A615, ASTM A706, ASTM A775, ASTM A934**
Welded Steel Wire Fabric	**ASTM A1064, ASTM A884**
Welded Deformed Steel Fabric	**ASTM A1064**
Bar Mats	**ASTM A184 or ASTM A704**

610-2.11 Materials for curing concrete. Curing materials shall conform to one of the following:

Materials for Curing

Waterproof paper	**ASTM C171**
Clear or white Polyethylene Sheeting	**ASTM C171**
White-pigmented Liquid Membrane-Forming Compound, Type 2, Class B	**ASTM C309**

CONSTRUCTION METHODS

610-3.1 General. The Contractor shall furnish all labor, materials, and services necessary for, and incidental to, the completion of all work as shown on the drawings and specified here. All machinery and equipment used by the Contractor on the work, shall be of sufficient size to meet the requirements of the work. All work shall be subject to the inspection and approval of the RPR.

610-3.2 Concrete Mixture. The concrete shall develop a compressive strength of 4000 psi in 28 days as determined by test cylinders made in accordance with ASTM C31 and tested in

accordance with ASTM C39. The concrete shall contain not less than 470 pounds of cementitious material per cubic yard. The water cementitious ratio shall not exceed 0.45 by weight. The air content of the concrete shall be 5% +/- 1.2% as determined by ASTM C231 and shall have a slump of not more than 4 inches as determined by ASTM C143.

610-3.3 Mixing. Concrete may be mixed at the construction site, at a central point, or wholly or in part in truck mixers. The concrete shall be mixed and delivered in accordance with the requirements of ASTM C94 or ASTM C685.

The concrete shall be mixed only in quantities required for immediate use. Concrete shall not be mixed while the air temperature is below 40°F without the RPRs approval. If approval is granted for mixing under such conditions, aggregates or water, or both, shall be heated and the concrete shall be placed at a temperature not less than 50°F nor more than 100°F. The Contractor shall be held responsible for any defective work, resulting from freezing or injury in any manner during placing and curing, and shall replace such work at his expense.

Retempering of concrete by adding water or any other material is not permitted.

The rate of delivery of concrete to the job shall be sufficient to allow uninterrupted placement of the concrete.

610-3.4 Forms. Concrete shall not be placed until all the forms and reinforcements have been inspected and approved by the RPR. Forms shall be of suitable material and shall be of the type, size, shape, quality, and strength to build the structure as shown on the plans. The forms shall be true to line and grade and shall be mortar-tight and sufficiently rigid to prevent displacement and sagging between supports. The surfaces of forms shall be smooth and free from irregularities, dents, sags, and holes. The Contractor shall be responsible for their adequacy.

The internal form ties shall be arranged so no metal will show in the concrete surface or discolor the surface when exposed to weathering when the forms are removed. All forms shall be wetted with water or with a non-staining mineral oil, which shall be applied immediately before the concrete is placed. Forms shall be constructed so they can be removed without injuring the concrete or concrete surface.

610-3.5 Placing reinforcement. All reinforcement shall be accurately placed, as shown on the plans, and shall be firmly held in position during concrete placement. Bars shall be fastened together at intersections. The reinforcement shall be supported by approved metal chairs. Shop drawings, lists, and bending details shall be supplied by the Contractor when required.

610-3.6 Embedded items. Before placing concrete, all embedded items shall be firmly and securely fastened in place as indicated. All embedded items shall be clean and free from coating, rust, scale, oil, or any foreign matter. The concrete shall be spaded and consolidated around and against embedded items. The embedding of wood shall not be allowed.

610-3.7 Concrete Consistency. The Contractor shall monitor the consistency of the concrete delivered to the project site; collect each batch ticket; check temperature; and perform slump tests on each truck at the project site in accordance with ASTM C143.

610-3.8 Placing concrete. All concrete shall be placed during daylight hours, unless otherwise approved. The concrete shall not be placed until the depth and condition of foundations, the adequacy of forms and falsework, and the placing of the steel reinforcing have been approved by the RPR. Concrete shall be placed as soon as practical after mixing, but in no case later than one

(1) hour after water has been added to the mix. The method and manner of placing shall avoid segregation and displacement of the reinforcement. Troughs, pipes, and chutes shall be used as an aid in placing concrete when necessary. The concrete shall not be dropped from a height of more than 5 feet. Concrete shall be deposited as nearly as practical in its final position to avoid segregation due to rehandling or flowing. Do not subject concrete to procedures which cause segregation. Concrete shall be placed on clean, damp surfaces, free from running water, or on a properly consolidated soil foundation.

610-3.9 Vibration. Vibration shall follow the guidelines in American Concrete Institute (ACI) Committee 309R, Guide for Consolidation of Concrete.

610-3.10 Joints. Joints shall be constructed as indicated on the plans.

610-3.11 Finishing. All exposed concrete surfaces shall be true, smooth, and free from open or rough areas, depressions, or projections. All concrete horizontal plane surfaces shall be brought flush to the proper elevation with the finished top surface struck-off with a straightedge and floated.

610-3.12 Curing and protection. All concrete shall be properly cured in accordance with the recommendations in American Concrete Institute (ACI) 308R, Guide to External Curing of Concrete. The concrete shall be protected from damage until project acceptance.

610-3.13 Cold weather placing. When concrete is placed at temperatures below 40°F, follow the cold weather concreting recommendations found in ACI 306R, Cold Weather Concreting.

610-3.14 Hot weather placing. When concrete is placed in hot weather greater than 85ºF, follow the hot weather concreting recommendations found in ACI 305R, Hot Weather Concreting.

QUALITY ASSURANCE (QA)

610-4.1 Quality Assurance sampling and testing. Concrete for each day's placement will be accepted on the basis of the compressive strength specified in paragraph 610-3.2. The RPR will sample the concrete in accordance with ASTM C172; test the slump in accordance with ASTM C143; **[** test air content in accordance with ASTM C231; **]** make and cure compressive strength specimens in accordance with ASTM C31; and test in accordance with ASTM C39. The QA testing agency will meet the requirements of ASTM C1077.

The Contractor shall provide adequate facilities for the initial curing of cylinders.

610-4.2 Defective work. Any defective work that cannot be satisfactorily repaired as determined by the RPR, shall be removed and replaced at the Contractor's expense. Defective work includes, but is not limited to, uneven dimensions, honeycombing and other voids on the surface or edges of the concrete.

METHOD OF MEASUREMENT

610-5.1 Concrete shall be considered incidental and no separate measurement shall be made.

BASIS OF PAYMENT

610-6.1 Concrete shall be considered incidental and no separate payment shall be made.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM A184	Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement
ASTM A615	Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A704	Standard Specification for Welded Steel Plain Bar or Rod Mats for Concrete Reinforcement
ASTM A706	Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A775	Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A884	Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement
ASTM A934	Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
ASTM A1064	Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM C31	Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33	Standard Specification for Concrete Aggregates
ASTM C39	Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C94	Standard Specification for Ready-Mixed Concrete
ASTM C136	Standard Test Method for Sieve or Screen Analysis of Fine and Coarse Aggregates
ASTM C114	Standard Test Methods for Chemical Analysis of Hydraulic Cement
ASTM C136	Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM C143	Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150	Standard Specification for Portland Cement
ASTM C171	Standard Specification for Sheet Materials for Curing Concrete
ASTM C172	Standard Practice for Sampling Freshly Mixed Concrete
ASTM C231	Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

ASTM C260	Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C309	Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C311	Standard Test Methods for Sampling and Testing Fly Ash or Natural Pozzolans for Use in Portland-Cement Concrete
ASTM C494	Standard Specification for Chemical Admixtures for Concrete
ASTM C618	Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C666	Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing
ASTM C685	Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing
ASTM C989	Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM C1017	Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1077	Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1157	Standard Performance Specification for Hydraulic Cement
ASTM C1260	Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C1365	Standard Test Method for Determination of the Proportion of Phases in Portland Cement and Portland-Cement Clinker Using X-Ray Powder Diffraction Analysis
ASTM C1602	Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete
ASTM D1751	Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Asphalt Types)
ASTM D1752	Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction

American Concrete Institute (ACI)

ACI 305R	Hot Weather Concreting
ACI 306R	Cold Weather Concreting
ACI 308R	Guide to External Curing of Concrete
ACI 309R	Guide for Consolidation of Concrete

END OF ITEM P-610

(Section 32 31 13) Item F-162 Chain-Link Fence

DESCRIPTION

162-1.1 This item shall consist of furnishing and erecting a chain-link fence in accordance with these specifications, the details shown on the plans, and in conformity with the lines and grades shown on the plans or established by the RPR.

MATERIALS

162-2.1 Fabric. The fabric shall be woven with a 9-gauge galvanized steel wire in a 2-inch mesh and shall meet the requirements of ASTM A392.

162-2.2 Barbed wire. Barbed wire shall be 2-strand 12-1/2 gauge **zinc-coated]** wire with 4-point barbs and shall conform to the requirements of ASTM A121, Class 3, Chain Link Fence Grade.

162-2.3 Posts, rails, and braces. Line posts, rails, and braces shall conform to the requirements of ASTM F1043 or ASTM F1083 as follows:

- Galvanized tubular steel pipe shall conform to the requirements of Group IA, (Schedule 40) coatings conforming to Type A, or Group IC (High Strength Pipe), External coating Type B, and internal coating Type B or D.
- Roll Formed Steel Shapes (C-Sections) shall conform to the requirements of Group IIA, and be galvanized in accordance with the requirements of ASTM F1043, Type A.
- Hot-Rolled Shapes (H Beams) shall meet the requirements of Group III, and be galvanized in accordance with the requirements of ASTM F1043, Type A.
- Composite posts shall conform to the strength requirements of ASTM F1043 or ASTM F1083. The strength loss of composite posts shall not exceed 10% when subjected to 3,600 hours of exposure to light and water in accordance with ASTM G152, ASTM G153, ASTM G154, and ASTM G155.

The dimensions of the posts, rails, and braces shall be in accordance with Tables I through VI of Federal Specification RR-F-191/3.

162-2.4 Gates. Gate frames shall consist of **galvanized steel pipe** and shall conform to the specifications for the same material under paragraph 162-2.3. Gate frames shall be as specified in Item F-165 – Cantilever Gates for Chain Link Fence. The fabric shall be of the same type material as used in the fence.

162-2.5 Wire ties and tension wires. Wire ties for use in conjunction with a given type of fabric shall be of the same material and coating weight identified with the fabric type. Tension wire shall be 7-gauge marcelled steel wire with the same coating as the fabric type and shall conform to ASTM A824.

All material shall conform to Federal Specification RR-F-191/4.

162-2.6 Miscellaneous fittings and hardware. Miscellaneous steel fittings and hardware for use with **zinc-coated** steel fabric shall be of commercial grade steel or better quality, wrought or cast as appropriate to the article, and sufficient in strength to provide a balanced design when used in conjunction with fabric posts, and wires of the quality specified herein. **All steel fittings and hardware shall be protected with a zinc coating applied in conformance with ASTM A153.** Barbed wire support arms shall withstand a load of 250 pounds applied vertically to the outermost end of the arm.

162-2.7 Concrete. Concrete shall have a minimum 28-day compressive strength of 3000 psi.

162-2.8 Marking. Each roll of fabric shall carry a tag showing the kind of base metal (steel, aluminum, or aluminum alloy number), kind of coating, the gauge of the wire, the length of fencing in the roll, and the name of the manufacturer. Posts, wire, and other fittings shall be identified as to manufacturer, kind of base metal (steel, aluminum, or aluminum alloy number), and kind of coating.

CONSTRUCTION METHODS

162-3.1 General. The fence shall be constructed in accordance with the details on the plans and as specified here using new materials. All work shall be performed in a workmanlike manner satisfactory to the RPR. **The Contractor shall layout the fence line based on the plans.** The Contractor shall span the opening below the fence with barbed wire at all locations where it is not practical to conform the fence to the general contour of the ground surface because of natural or manmade features such as drainage ditches. The new fence shall be permanently tied to the terminals of existing fences as shown on the plans. The Contractor shall stake down the woven wire fence at several points between posts as shown on the plans.

The Contractor shall arrange the work so that construction of the new fence will immediately follow the removal of existing fences. The length of unfenced section at any time shall not exceed 300 feet. The work shall progress in this manner and at the close of the working day the newly constructed fence shall be tied to the existing fence.

162-3.2 Clearing fence line. Clearing shall consist of the removal of all stumps, brush, rocks, trees, or other obstructions that will interfere with proper construction of the fence. Stumps within the cleared area of the fence shall be grubbed or excavated. The bottom of the fence shall be placed a uniform distance above ground, as specified in the plans. When shown on the plans or as directed by the RPR, the existing fences which interfere with the new fence location shall be removed by the Contractor as a part of the construction work unless such removal is listed as a separate item in the bid schedule. All holes remaining after post and stump removal shall be refilled with suitable soil, gravel, or other suitable material and compacted with tampers.

The cost of removing and disposing of the material shall not constitute a pay item and shall be considered incidental to fence construction.

162-3.3 Installing posts. All posts shall be set in concrete at the required dimension and depth and at the spacing shown on the plans.

The concrete shall be thoroughly compacted around the posts by tamping or vibrating and shall have a smooth finish slightly higher than the ground and sloped to drain away from the posts. All posts shall be set plumb and to the required grade and alignment. No materials shall be installed on the posts, nor shall the posts be disturbed in any manner within seven (7) days after the individual post footing is completed.

Should rock be encountered at a depth less than the planned footing depth, a hole 2 inches larger than the greatest dimension of the posts shall be drilled to a depth of 12 inches. After the posts are set, the remainder of the drilled hole shall be filled with grout, composed of one part Portland cement and two parts mortar sand. Any remaining space above the rock shall be filled with concrete in the manner described above.

In lieu of drilling, the rock may be excavated to the required footing depth. No extra compensation shall be made for rock excavation.

162-3.4 Installing top rails. The top rail shall be continuous and shall pass through the post tops. The coupling used to join the top rail lengths shall allow for expansion.

162-3.5 Installing braces. Horizontal brace rails, with diagonal truss rods and turnbuckles, shall be installed at all terminal posts.

162-3.6 Installing fabric. The wire fabric shall be firmly attached to the posts and braced as shown on the plans. All wire shall be stretched taut and shall be installed to the required elevations. The fence shall generally follow the contour of the ground, with the bottom of the fence fabric no less than one inch or more than 4 inches from the ground surface. Grading shall be performed where necessary to provide a neat appearance.

At locations of small natural swales or drainage ditches and where it is not practical to have the fence conform to the general contour of the ground surface, longer posts may be used and multiple strands of barbed wire stretched to span the opening below the fence. The vertical clearance between strands of barbed wire shall be 6 inches or less.

162-3.7 Electrical grounds. Electrical grounds shall be constructed **at 500 feet intervals.]** The ground shall be accomplished with a copper clad rod 8 feet long and a minimum of 5/8 inches in diameter driven vertically until the top is 6 inches below the ground surface. A No. 6 solid copper conductor shall be clamped to the rod and to the fence in such a manner that each element of the fence is grounded. Installation of ground rods shall not constitute a pay item and shall be considered incidental to fence construction. The Contractor shall comply with FAA-STD-019, Lightning and Surge Protection, Grounding, Bonding and Shielding Requirements for Facilities and Electronic Equipment, paragraph 4.2.3.8, Lightning Protection for Fences and Gates, when fencing is adjacent to FAA facilities.

162-3.8 Cleaning up. The Contractor shall remove from the vicinity of the completed work all tools, buildings, equipment, etc., used during construction. All disturbed areas shall be seeded per T-901.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM A121	Standard Specification for Metallic-Coated Carbon Steel Barbed Wire
ASTM A153	Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

ASTM A392	Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric
ASTM A491	Standard Specification for Aluminum-Coated Steel Chain-Link Fence Fabric
ASTM A824	Standard Specification for Metallic-Coated Steel Marcelled Tension Wire for Use with Chain Link Fence
ASTM B117	Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM F668	Standard Specification for Polyvinyl Chloride (PVC), Polyolefin and other Organic Polymer Coated Steel Chain-Link Fence Fabric
ASTM F1043	Standard Specification for Strength and Protective Coatings on Steel Industrial Fence Framework
ASTM F1083	Standard Specification for Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures
ASTM F1183	Standard Specification for Aluminum Alloy Chain Link Fence Fabric
ASTM F1345	Standard Specification for Zinc 5% Aluminum-Mischmetal Alloy Coated Steel Chain-Link Fence Fabric
ASTM G152	Standard Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
ASTM G153	Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
ASTM G154	Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials
ASTM G155	Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Nonmetallic Materials

Federal Specifications (FED SPEC)

FED SPEC RR-F-191/3	Fencing, Wire and Post, Metal (Chain-Link Fence Posts, Top Rails and Braces)
FED SPEC RR-F-191/4	Fencing, Wire and Post, Metal (Chain-Link Fence Accessories)

FAA Standard

FAA-STD-019	Lightning and Surge Protection, Grounding, Bonding and Shielding Requirements for Facilities and Electronic Equipment

FAA Orders

5300.38	AIP Handbook

END OF ITEM F-162

SECTION 32 91 13- SOIL PREPARATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section describes preparation of soil including application of herbicide and soil amendments.

1.2 RELATED WORK SPECIFIED ELSEWHERE

A. Section 32 92 00, “Turf and Grasses”

B. Section 32 93 00, “Planting”

1.3 SUBMITTALS

A. Submit certification of quantities of fertilizer and compost delivered to the site to the architect.

B. Submit to the architect for approval a sample of garden care compost and yard debris compost.

1.4 PRODUCT DELIVERY

A. Deliver fertilizer to the site in original unopened containers, each bearing the manufacturer’s guaranteed analysis.

1.5 PROTECTION

A. Protect utility lines, storm drainage lines, site improvements, and underground irrigation system during execution of work. See Section 015000, Temporary Facilities and Controls.

PART 2 - PRODUCTS

2.1 SOIL AMENDMENTS

A. Lime: Dolomite lime, No. 10.

2.2 CONTACT HERBICIDE

A. Roundup Pro, or equal.

2.3 TOPSOIL

A. Clean, fertile, friable, natural soil material free of debris, roots, stones, weeds, and grass.

PART 3 - EXECUTION

3.1 HERBICIDE APPLICATION

A. Apply contact herbicide over all areas of weed or grass growth within landscaped area.

B. Apply in two applications as follows:
   1. First application, apply seven days prior to performing earthwork.
   2. Second application (to kill new vegetation), apply after grading has been completed and 48 hours prior to planting.

C. Observe manufacturer's recommended period prior to working in treated areas.

D. Apply at manufacturer's maximum recommended application rate.

E. Do not apply herbicide to impervious areas unless specifically directed to do so by the contract documents.

3.2 SOIL PREPARATION

A. Remove stones, mortar, concrete, asphalt, rubbish, debris, and other materials larger than 1 1/2 inches from planting areas. See Section 329119, Landscape Grading.
   1. If existing soil base is not suitable for use, remove top 2 inches and replace with suitable topsoil.

B. Level soil surface to ___ inch(es) below finish elevation. Use excess suitable material as fill elsewhere in the work area, if required.

C. Lawn area finished surface shall match top of curb or sidewalk elevation. Planting area finished surface shall be ___ inch(es) below curb top prior to mulch application.

D. See Section 329119, Landscape Grading, if existing soil is not sandy or silty, thus requiring over-excavation and placement of fill material.

E. Amend existing clean base with 4 inches of soil and till to a depth of 5 inches to eliminate layering of the soil and sand base.

1. Add 2 inches of yard debris compost and fertilizer, as specified, and lime (if lawn area) and till to a depth of 3 inches to 5 inches to incorporate.

F. Amend soil with compost at the rates described below to achieve a total 6-inch layer of amended soil material. Apply in the following order.
   1. Add 2 inches (6 cubic yards per 1,000 square feet) of yard debris compost.
   2. For each 1,000 square feet, apply 10 pounds of 34-0-0 and 4 pounds of 16-16-16. Do not apply fertilizer to impervious areas. Use deflectors to prevent improper application.
   3. Rototill, in two directions, to a depth of 6 inches, to create a uniform mix of soil and Yard Debris Compost.

G. Within the lawn areas, apply lime at a rate of 50 pounds per 1000 square feet.

H. Rake and smooth planting area to a tolerance of 1 inch, plus or minus, in 10 feet.

I. See Section 329300, Plants, for application of prepared soil mix in planting pits.

END OF SECTION 32 91 13

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SECTION 32 92 00 - TURF AND GRASSES (BAHIA)

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Requirements relating to sodding of lawns and turfgrass areas including site preparation, material installation and removal policies.

1.2 DEFINITIONS

A. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. This includes insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. It also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant.

B. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 1.8

1.3 COORDINATION:

A. Coordinate installation of turfgrass with other work to stabilize affected areas.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's installation instructions.

B. Samples:

1. Submit
2. Reviewed and accepted samples may be returned to the contractor.

1.5 INFORMATIONAL SUBMITTALS

A. Product Data: Manufacturer's product data and installation instructions.

B. Material Certificates: For soil preparation materials.

C. Certification of Bahia Turfgrass.

1. Certification of turfgrass sod from supplier.

D. Product certificates: For Fertilizer material

1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape Installer whose work has resulted in successful turf establishment projects of comparable size.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.

2. Pesticide Applicator: State licensed, commercial.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Seed and Other Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws, as applicable.

B. Sod: Harvest, deliver, store, and handle sod according to requirements in "Specifications for Turfgrass Sod Materials" and "Specifications for Turfgrass Sod Transplanting and Installation" sections in TPI's "Guideline Specifications to Turfgrass Sodding." Deliver sod within 24 hours of harvesting and in time for planting promptly. Protect sod from breakage and drying.

1.8 SOIL PREPARATION

A. Remove stones, mortar, concrete, asphalt, rubbish, debris and any other material larger than 1 ½” from planting areas.

1. If existing soil base is not suitable for use, remove top 2” and replace with suitable topsoil.

B. Level soil surface to ½ inch(es) below finish elevation. Use excess suitable material as fill elsewhere in the work area, if required.

C. Lawn area finished surface shall match top of curb or sidewalk elevation.

D. Add 2 inches of yard debris compost and fertilizer, as specified, and lime and till to a depth of 3 inches to 5 inches to incorporate.

E. Rototill, in two directions, to a depth of 6 inches, to create a uniform mix of soil and Yard Debris Compost.

F. Within the lawn areas, apply lime at a rate of 50 pounds per 1,000 square feet.

G. Rake and smooth area to a tolerance of 1 inch, plus or minus.

PART 2 - PRODUCTS

2.1 BAHIA TURFGRASS SOD

A. Turfgrass Sod: Furnish viable sod of uniform density, color, and texture that is strongly rooted and capable of vigorous growth and development when planted.

1. Use a 1/4inch shallow cut rolled sod from a reputable local grower.
2. Species should be wear-resistant, free from disease, and in excellent condition.
3. Sod shall be grown in sand or sandy loam soils only. Sod grown in soils of clay, silt, or high organic materials such as peat, will not be accepted.

2.2 FERTILIZERS

A. Commercial "Starter" Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast- and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 10-10-10 Nitrogen, Phosphorous, and Potassium, by weight. In a ratio that will provide 40lbs/acre

2. Liming is only needed when soil pH is below 5.5. Lime as needed 3-6 months prior to fertilization to allow for the lime to react with the soil.

2.3 SODDING

A. Lay sod within 24 hours of harvesting. Do not lay sod if dormant or if ground is frozen or muddy.

B. Lay sod to form a solid mass with tightly fitted joints, moistened and rolled to create good contact for growth. Butt ends and sides of sod; do not stretch or overlap. Stagger sod strips or pads to offset joints in adjacent courses. Avoid damage to soil or sod during installation. Tamp and roll lightly to ensure contact with soil, eliminate air pockets, and form a smooth surface. Work sifted soil or fine sand into minor cracks between pieces of sod; remove excess to avoid smothering sod and adjacent grass.

1. Lay sod across slopes exceeding 1:3.

2. Anchor sod on slopes exceeding 1:6 with wood pegs or steel staples spaced as recommended by sod manufacturer but not less than two anchors per sod strip to prevent slippage.

C. Saturate sod with fine water spray within two hours of planting. During first week after planting, water daily or more frequently as necessary to maintain moist soil.

D. Sodded areas must be fertilized and kept moist during root establishment (minimum of 3 weeks).

2.4 TURF MAINTENANCE

A. General: Maintain and establish turf by watering, fertilizing, weeding, mowing, trimming, replanting, and performing other operations as required to establish healthy, viable turf. Roll, regrade, and replant bare or eroded areas and remulch to produce a uniformly smooth turf. Provide materials and installation the same as those used in the original installation.

B. Mow turf as soon as top growth is tall enough to cut. Repeat mowing to maintain specified height without cutting more than one-third of grass height. Remove no more than one-third of grass-leaf growth in initial or subsequent mowings.

2.5 SATISFACTORY TURF

A. Turf installations shall meet the following criteria as determined by Architect:

1. Satisfactory Sodded Turf: At end of maintenance period, a healthy, well-rooted, even-colored, viable turf has been established, free of weeds, open joints, bare areas, and surface irregularities.

B. Use specified materials to reestablish turf that does not comply with requirements, and continue maintenance until turf is satisfactory.

2.6 CLEANUP AND PROTECTION

A. Promptly remove soil and debris created by turf work from paved areas. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material, including excess subsoil, unsuitable soil, trash, and debris, and legally dispose of them off Owner's property.

C. Erect temporary fencing or barricades and warning signs as required to protect newly planted areas from traffic. Maintain fencing and barricades throughout initial maintenance period and remove after plantings are established. Any barricades constructed must still be accessible by emergency and fire equipment during and after construction.

1. Sodded areas must be protected from any traffic, other than emergency vehicles, for a period of 3 to 4 weeks, or until root system has penetrated.

D. Remove nondegradable erosion-control measures after grass establishment period.

E. Repair any damage to adjacent materials and surfaces resulting from installation of this work.

END OF SECTION 32 92 00

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SECTION 32 93 00 - PLANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

A. Section Includes:

1. Cast iron tree grates.
2. Tree grate frames.
3. Fabricated steel tree guards.
4. Cast iron tree fences.
5. Plants.
6. Tree stabilization.
7. Tree-watering devices.
8. Landscape edgings.

B. Related Requirements:
1. Section 32 92 00 "Turf and Grasses" for turf (lawn) and meadow planting, hydroseeding, and erosion-control materials.

1.3 ALLOWANCES

A. Allowances for plants are specified in Section 01 21 00 "Allowances."

1. Perform planting work under quantity allowances and only as authorized. Authorized work includes work required by Drawings Sheet L100 and the Specifications and work authorized in writing by Architect.
2. Notify Architect of extent of work performed that is attributable to quantity allowances.
3. Perform work that exceeds quantity allowances only as authorized by Change Orders.

B. Furnish trees as part of tree allowance.

C. Furnish as part of Sheet L100

1.4 UNIT PRICES

A. Work of this Section is affected by unit prices specified in Section 012200 "Unit Prices."

B. Unit prices apply to authorized work covered by quantity allowances.

C. Unit prices apply to additions to and deletions from the Work as authorized by Change Orders.

1.5 DEFINITIONS

A. Backfill: The earth used to replace or the act of replacing earth in an excavation.

B. Balled and Burlapped Stock: Plants dug with firm, natural balls of earth in which they were grown, with a ball size not less than sizes indicated and diameter and depth recommended by ANSI Z60.1 for type and size of plant required; wrapped with burlap, tied, rigidly supported, and drum laced with twine with the root flare visible at the surface of the ball as recommended by ANSI Z60.1.

C. Balled and Potted Stock: Plants dug with firm, natural balls of earth in which they are grown and placed, unbroken, in a container. Ball size is not less than sizes indicated and diameter and depth recommended by ANSI Z60.1 for type and size of plant required.

D. Bare-Root Stock: Plants with a well-branched, fibrous-root system developed by transplanting or root pruning, with soil or growing medium removed, and with not less than the minimum root spread according to ANSI Z60.1 for type and size of plant required.

E. Container-Grown Stock: Healthy, vigorous, well-rooted plants grown in a container, with a well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for type and size of plant required.

F. Fabric Bag-Grown Stock: Healthy, vigorous, well-rooted plants established and grown in-ground in a porous fabric bag with well-established root system reaching sides of fabric bag. Fabric bag size is not less than diameter, depth, and volume required by ANSI Z60.1 for type and size of plant.

G. Finish Grade: Elevation of finished surface of planting soil.

H. Pesticide: A substance or mixture intended for preventing, destroying, repelling, or mitigating a pest. Pesticides include insecticides, miticides, herbicides, fungicides, rodenticides, and molluscicides. They also include substances or mixtures intended for use as a plant regulator, defoliant, or desiccant. Some sources classify herbicides separately from pesticides.

I. Pests: Living organisms that occur where they are not desired or that cause damage to plants, animals, or people. Pests include insects, mites, grubs, mollusks (snails and slugs), rodents (gophers, moles, and mice), unwanted plants (weeds), fungi, bacteria, and viruses.

J. Planting Area: Areas to be planted.

K. Planting Soil: Existing, on-site soil; imported soil; or manufactured soil that has been modified with soil amendments and perhaps fertilizers to produce a soil mixture best for plant growth. See Section 32 91 13, "Soil Preparation for drawing designations for planting soils.

L. Plant; Plants; Plant Material: These terms refer to vegetation in general, including trees, shrubs, vines, ground covers, ornamental grasses, bulbs, corms, tubers, or herbaceous vegetation.

M. Root Flare: Also called "trunk flare." The area at the base of the plant's stem or trunk where the stem or trunk broadens to form roots; the area of transition between the root system and the stem or trunk.

N. Stem Girdling Roots: Roots that encircle the stems (trunks) of trees below the soil surface.

O. Subgrade: The surface or elevation of subsoil remaining after excavation is complete, or the top surface of a fill or backfill before planting soil is placed.

1.6 COORDINATION

A. Coordination with Turf Areas (Lawns): Plant trees, shrubs, and other plants after finish grades are established and before planting turf areas unless otherwise indicated.

1. When planting trees, shrubs, and other plants after planting turf areas, protect turf areas, and promptly repair damage caused by planting operations.

1.7 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at DESTIN-FORT WALTON BEACH AIRPORT.

1.8 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Plant Materials: Include quantities, sizes, quality, and sources for plant materials.
2. Plant Photographs: Include color photographs in digital format of each required species and size of plant material as it will be furnished to Project. Take photographs from an angle depicting true size and condition of the typical plant to be furnished. Include a scale rod or other measuring device in each photograph. For species where more than

20 plants are required, include a minimum of three photographs showing the average plant, the best quality plant, and the worst quality plant to be furnished. Identify each photograph with the full scientific name of the plant, plant size, and name of the growing nursery.

B. Samples for Verification: For each of the following:

1. Trees and Shrubs: Three Samples of each variety and size delivered to site for review. Maintain approved Samples on-site as a standard for comparison.
2. Mulch: 1-quart (1-L) volume of each organic mulch required; in sealed plastic bags labeled with composition of materials by percentage of weight and source of mulch. Each Sample shall be typical of the lot of material to be furnished; provide an accurate representation of color, texture, and organic makeup.
3. Mineral Mulch: 2 lb (1.0 kg) of each mineral mulch required, in sealed plastic bags labeled with source of mulch. Sample shall be typical of the lot of material to be delivered and installed on-site; provide an accurate indication of color, texture, and makeup of the material.
4. Weed Control Barrier: 12 by 12 inches (300 by 300 mm).
5. Proprietary Root-Ball-Stabilization Device: One unit.
6. Slow-Release, Tree-Watering Device: One unit of each size required.
7. Edging Materials and Accessories: Manufacturer's standard size, to verify color selected.
8. Root Barrier: Width of panel by 12 inches (300 mm).

1.9 INFORMATIONAL SUBMITTALS

A. Qualification Data: For landscape Installer. Include list of similar projects completed by Installer demonstrating Installer's capabilities and experience. Include project names, addresses, and year completed, and include names and addresses of owners' contact persons.

B. Product Certificates: For each type of manufactured product, from manufacturer, and complying with the following:

1. Manufacturer's certified analysis of standard products.
2. Analysis of other materials by a recognized laboratory made according to methods established by the Association of Official Analytical Chemists, where applicable.

C. Pesticides and Herbicides: Product label and manufacturer's application instructions specific to Project.

D. Sample Warranty: For special warranty.

1.10 CLOSEOUT SUBMITTALS

A. Maintenance Data: Recommended procedures to be established by Owner for maintenance of plants during a calendar year. Submit before expiration of required maintenance periods.

1.11 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of plants.

1. Professional Membership: Installer shall be a member in good standing of either the Professional Landcare Network or the American Nursery and Landscape Association.
2. Experience: Three years' experience in landscape installation in addition to requirements in Section 014500 "Quality Requirements."
3. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on Project site when work is in progress.
4. Personnel Certifications: Installer's personnel assigned to the Work shall have certification in one of the following categories from the Professional Landcare Network:

   a. Landscape Industry Certified Technician - Exterior.
   b. Landscape Industry Certified Horticultural Technician.

5. Pesticide Applicator: State licensed, commercial.

B. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1.

1. Selection of plants purchased under allowances is made by Architect, who tags plants at their place of growth before they are prepared for transplanting.

C. Measurements: Measure according to ANSI Z60.1. Do not prune to obtain required sizes.

1. Trees and Shrubs: Measure with branches and trunks or canes in their normal position. Take height measurements from or near the top of the root flare for field-grown stock and container-grown stock. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip to tip. Take caliper measurements 6 inches (150 mm) above the root flare for trees up to 4-inch (100-mm) caliper size, and 12 inches (300 mm) above the root flare for larger sizes.
2. Other Plants: Measure with stems, petioles, and foliage in their normal position.

D. Plant Material Observation: Architect may observe plant material either at place of growth or at site before planting for compliance with requirements for genus, species, variety, cultivar, size, and quality. Architect may also observe trees and shrubs further for size and condition of balls and root systems, pests, disease symptoms, injuries, and latent defects and may reject unsatisfactory or defective material at any time during progress of work. Remove rejected trees or shrubs immediately from Project site.

1. Notify Architect of sources of planting materials [**seven**] <**Insert number**> days in advance of delivery to site.

1.12 DELIVERY, STORAGE, AND HANDLING

A. Packaged Materials: Deliver packaged materials in original, unopened containers showing weight, certified analysis, name and address of manufacturer, and indication of compliance with state and Federal laws if applicable.

B. Bulk Materials:

1. Do not dump or store bulk materials near structures, utilities, walkways and pavements, or on existing turf areas or plants.
2. Provide erosion-control measures to prevent erosion or displacement of bulk materials; discharge of soil-bearing water runoff; and airborne dust reaching adjacent properties, water conveyance systems, or walkways.
3. Accompany each delivery of bulk materials with appropriate certificates.

C. Deliver bare-root stock plants within 24 hours of digging. Immediately after digging up bare-root stock, pack root system in wet straw, hay, or other suitable material to keep root system moist until planting. Transport in covered, temperature-controlled vehicles, and keep plants cool and protected from sun and wind at all times.

D. Do not prune trees and shrubs before delivery. Protect bark, branches, and root systems from sun scald, drying, wind burn, sweating, whipping, and other handling and tying damage. Do not bend or bind-tie trees or shrubs in such a manner as to destroy their natural shape. Provide protective covering of plants during shipping and delivery. Do not drop plants during delivery and handling.

E. Handle planting stock by root ball.

F. Store bulbs, corms, and tubers in a dry place at 60 to 65 deg F (16 to 18 deg C) until planting.

G. Apply antidesiccant to trees and shrubs using power spray to provide an adequate film over trunks (before wrapping), branches, stems, twigs, and foliage to protect during digging, handling, and transportation.

1. If deciduous trees or shrubs are moved in full leaf, spray with antidesiccant at nursery before moving and again two weeks after planting.

H. Wrap trees and shrubs with burlap fabric over trunks, branches, stems, twigs, and foliage to protect from wind and other damage during digging, handling, and transportation.

I. Deliver plants after preparations for planting have been completed, and install immediately. If planting is delayed more than six hours after delivery, set plants and trees in their

appropriate aspect (sun, filtered sun, or shade), protect from weather and mechanical damage, and keep roots moist.

1. Heel-in bare-root stock. Soak roots that are in less than moist condition in water for two hours. Reject plants with dry roots.
2. Set balled stock on ground and cover ball with soil, peat moss, sawdust, or other acceptable material.
3. Do not remove container-grown stock from containers before time of planting.
4. Water root systems of plants stored on-site deeply and thoroughly with a fine-mist spray. Water as often as necessary to maintain root systems in a moist, but not overly wet condition.

1.13 FIELD CONDITIONS

A. Field Measurements: Verify actual grade elevations, service and utility locations, irrigation system components, and dimensions of plantings and construction contiguous with new plantings by field measurements before proceeding with planting work.

B. Planting Restrictions: Plant during one of the following periods. Coordinate planting periods with maintenance periods to provide required maintenance from date of Substantial Completion.

1. Spring Planting: <Insert dates>.
2. Fall Planting: <Insert dates>.

C. Weather Limitations: Proceed with planting only when existing and forecasted weather conditions permit planting to be performed when beneficial and optimum results may be obtained. Apply products during favorable weather conditions according to manufacturer's written instructions and warranty requirements.

1.14 WARRANTY

A. Special Warranty: Installer agrees to repair or replace plantings and accessories that fail in materials, workmanship, or growth within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Death and unsatisfactory growth, except for defects resulting from abuse, lack of adequate maintenance, or neglect by Owner.
b. Structural failures including plantings falling or blowing over.
c. Faulty performance of [tree stabilization] [edgings] [and] [tree grates] <Insert item>.
d. Deterioration of metals, metal finishes, and other materials beyond normal weathering.

2. Warranty Periods: From date of Substantial Completion.

3. Warranty periods in "Trees, Shrubs, Vines, and Ornamental Grasses," "Ground Covers, Biennials, Perennials, and Other Plants," and "Annuals" subparagraphs below are examples only for some categories of plants; revise or insert other plant categories to suit Project.

   a. Trees, Shrubs, Vines, and Ornamental Grasses: 12 months.
   b. Ground Covers, Biennials, Perennials, and Other Plants: 12 months.

4. Include the following remedial actions as a minimum:

   a. Immediately remove dead plants and replace unless required to plant in the succeeding planting season.
   b. Replace plants that are more than 25 percent dead or in an unhealthy condition at end of warranty period.
   c. A limit of one replacement of each plant is required except for losses or replacements due to failure to comply with requirements.
   d. Provide extended warranty for period equal to original warranty period, for replaced plant material.

PART 2 - PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features indicated in Plant List, Plant Schedule, or Plant Legend indicated on Drawings and complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

   1. Trees with damaged, crooked, or multiple leaders; tight vertical branches where bark is squeezed between two branches or between branch and trunk ("included bark"); crossing trunks; cut-off limbs more than 3/4 inch (19 mm) in diameter; or with stem girdling roots are unacceptable.
   2. Collected Stock: Do not use plants harvested from the wild, from native stands, from an established landscape planting, or not grown in a nursery unless otherwise indicated.

B. Provide plants of sizes, grades, and ball or container sizes complying with ANSI Z60.1 for types and form of plants required. Plants of a larger size may be used if acceptable to Architect, with a proportionate increase in size of roots or balls.

C. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which begins at root flare according to ANSI Z60.1. Root flare shall be visible before planting.

D. Labeling: Label Each plant of each variety, size, and caliper with a securely attached, waterproof tag bearing legible designation of common name and full scientific name, including genus and species. Include nomenclature for hybrid, variety, or cultivar, if applicable for the plant.

E. If formal arrangements or consecutive order of plants is indicated on Drawings, select stock for uniform height and spread, and number the labels to assure symmetry in planting.

F. [**Annuals**] [**and**] [**Biennials**]: Provide healthy, disease-free plants of species and variety shown or listed, with well-established root systems reaching to sides of the container to maintain a firm ball, but not with excessive root growth encircling the container. Provide only plants that are acclimated to outdoor conditions before delivery **and that are in bud but not yet in bloom**.

2.2 FERTILIZERS

A. Planting Tablets: Tightly compressed chip-type, long-lasting, slow-release, commercial-grade planting fertilizer in tablet form. Tablets shall break down with soil bacteria, converting nutrients into a form that can be absorbed by plant roots.

1. Size: [**5-gram**] [**10-gram**] [**21-gram**] <**Insert size**> tablets.
2. Nutrient Composition: 20 percent nitrogen, 10 percent phosphorous, and 5 percent potassium, by weight plus micronutrients.

2.3 MULCHES

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:

1. Type: [**Shredded hardwood**] [**Ground or shredded bark**] [**Wood and bark chips**] [**Pine straw**] [**Salt hay or threshed straw**] [**Pine needles**] [**Peanut, pecan, and cocoa-bean shells**] <**Insert mulch type**>.
2. Size Range: [**3 inches (76 mm) maximum, 1/2 inch (13 mm) minimum**] <**Insert dimensions**>.
3. Color: Natural.

B. Compost Mulch: Well-composted, stable, and weed-free organic matter, pH of 5.5 to 8; moisture content 35 to 55 percent by weight; 100 percent passing through a 1-inch (25-mm) sieve; soluble-salt content of [**2 to 5**] <**Insert range or value**> dS/m; not exceeding 0.5 percent inert contaminants and free of substances toxic to plantings; and as follows:

1. Organic Matter Content: [**50 to 60**] <**Insert number range**> percent of dry weight.

2. Feedstock: Agricultural, food, or industrial residuals; biosolids; yard trimmings; or source-separated or compostable mixed solid waste.

C. Mineral Mulch: Hard, durable stone, washed free of loam, sand, clay, and other foreign substances, of the following type, size range, and color:

1. Type: [**Rounded riverbed gravel or smooth-faced stone**] [**Crushed stone or gravel**] [**Marble chips**] [**Granite chips**] <**Insert stone type**>.
2. Size Range: [**1-1/2 inches (38 mm) maximum, 3/4 inch (19 mm) minimum**] [**3/4 inch (19 mm) maximum, 1/4 inch (6.4 mm) minimum**] <**Insert dimensions**>.
3. Color: [**Uniform tan-beige color range acceptable to Architect**] [**Readily available natural gravel color range**] <**Insert color**>.

2.4 WEED-CONTROL BARRIERS

A. Nonwoven Geotextile Filter Fabric: Polypropylene or polyester fabric, 3 oz./sq. yd. (101g/sq. m) minimum, composed of fibers formed into a stable network so that fibers retain their relative position. Fabric shall be inert to biological degradation and resist naturally encountered chemicals, alkalis, and acids.

B. Composite Fabric: Woven, needle-punched polypropylene substrate bonded to a nonwoven polypropylene fabric, 4.8 oz./sq. yd. (162 g/sq. m).

2.5 PESTICIDES

A. General: Pesticide registered and approved by the EPA, acceptable to authorities having jurisdiction, and of type recommended by manufacturer for each specific problem and as required for Project conditions and application. Do not use restricted pesticides unless authorized in writing by authorities having jurisdiction.

B. Pre-Emergent Herbicide (Selective and Nonselective): Effective for controlling the germination or growth of weeds within planted areas at the soil level directly below the mulch layer.

C. Post-Emergent Herbicide (Selective and Nonselective): Effective for controlling weed growth that has already germinated.

2.6 TREE-STABILIZATION MATERIALS

A. Trunk-Stabilization Materials:

1. Upright and Guy Stakes: Rough-sawn, sound, new [**hardwood**] [**softwood with specified wood pressure-preservative treatment**], free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal (38-by-38-mm actual) by length indicated, pointed at one end.

2. Wood Deadmen: Timbers measuring 8 inches (200 mm) in diameter and 48 inches (1200 mm) long, treated with specified wood pressure-preservative treatment.
3. Flexible Ties: Wide rubber or elastic bands or straps of length required to reach stakes or [**turnbuckles**] [**compression springs**].
4. Guys and Tie Wires: ASTM A 641/A 641M, Class 1, galvanized-steel wire, two-strand, twisted, 0.106 inch (2.7 mm) in diameter.
5. Tree-Tie Webbing: UV-resistant polypropylene or nylon webbing with brass grommets.
6. Guy Cables: Five-strand, 3/16-inch- (4.8-mm-) diameter, galvanized-steel cable, with zinc-coated [**turnbuckles**] [**compression springs**], a minimum of 3 inches (75 mm) long, with two 3/8-inch (10-mm) galvanized eyebolts.
7. Flags: Standard surveyor's plastic flagging tape, white, 6 inches (150 mm) long.
8. Proprietary Staking-and-Guying Devices: Proprietary stake or anchor and adjustable tie systems to secure each new planting by plant stem; sized as indicated and according to manufacturer's written recommendations.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Arborbrace.
        2) Better Bilt Products, Inc.
        3) DeepRoot Green Infrastructure, LLC.
        4) Foresight Products, LLC.
        5) J. R. Partners.
        6) Villa Root Barrier.
        7) <**Insert manufacturer's name**>.

B. Root-Ball Stabilization Materials:

1. Upright Stakes and Horizontal Hold-Down: Rough-sawn, sound, new hardwood or softwood, free of knots, holes, cross grain, and other defects, 2-by-2-inch nominal (38-by-38-mm actual) by length indicated; stakes pointed at one end.
2. Wood Screws: ASME B18.6.1.
3. Proprietary Root-Ball Stabilization Devices: Proprietary at- or below-grade stabilization systems to secure each new planting by root ball and that do not encircle the trunk; sized according to manufacturer's written recommendations unless otherwise indicated.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Border Concepts, Inc.
        2) Foresight Products, LLC.
        3) Tree Staple, Inc.
        4) <**Insert manufacturer's name**>.

C. Palm Bracing: Battens or blocks, struts, straps, and protective padding.

1. Battens or Blocks and Struts: Rough-sawn, sound, new hardwood or softwood, free of knots, holes, cross grain, and other defects, 2-by-4-inch nominal (38-by-89-mm actual) by lengths indicated.
2. Straps: Adjustable steel or plastic package banding.
3. Padding: Burlap.
4. Proprietary Palm-Bracing Devices: Proprietary systems to secure each new planting by trunk; sized according to manufacturer's written recommendations unless otherwise indicated.

    a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

        1) Arborbrace.
        2) Better Bilt Products, Inc.
        3) Horticultural Consultants, Inc.
        4) Villa Root Barrier.
        5) <**Insert manufacturer's name**>.

2.7 LANDSCAPE EDGINGS

A. Wood Edging: Of sizes indicated on Drawings, and wood stakes as follows:

1. Species: [**Western red cedar, all heart**] [**Southern pine with specified wood pressure-preservative treatment**].
2. Stakes: Same species as edging, 1-by-2-inch nominal (19-by-38-mm actual) by 18 inches (450 mm) long, with galvanized nails for anchoring edging.

B. Steel Edging: Standard commercial-steel edging, fabricated in sections of standard lengths, with loops stamped from or welded to face of sections to receive stakes.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Border Concepts, Inc.
    b. Collier Metal Specialties, Inc.
    c. J. D. Russell Company (The).
    d. Sure-loc Edging Corporation.
    e. <**Insert manufacturer's name**>.

2. Edging Size: [**3/16 inch (4.8 mm) thick by 4 inches (100 mm) deep**] [**1/4 inch (6.4 mm) thick by 5 inches (125 mm) deep**] [**1/4 inch (6.4 mm) thick by 4 inches (100 mm) deep**] [**1/8 inch (3.2 mm) thick by 4 inches (100 mm) deep**] [**1/8 inch (3.2 mm) thick by 6 inches (150 mm) deep**] [**0.1 inch (2.5 mm) thick by 4 inches (100 mm) deep**] <**Insert dimensions**>.
3. Stakes: Tapered steel, a minimum of [**12 inches (300 mm)**] [**15 inches (380 mm)**] <**Insert dimension**> long.

4. Accessories: Standard tapered ends, corners, and splicers.
5. Finish: [**Manufacturer's standard paint**] [**Zinc coated**] [**Unfinished**].

    a. Paint Color: [**Black**] [**Green**] [**Brown**].

C. Aluminum Edging: Standard-profile extruded-aluminum edging, ASTM B 221 (ASTM B 221M), Alloy 6063-T6, fabricated in standard lengths with interlocking sections with loops stamped from face of sections to receive stakes.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Curv-Rite, Inc.
    b. J. D. Russell Company (The).
    c. Permaloc Corporation.
    d. Sure-loc Edging Corporation.
    e. <**Insert manufacturer's name**>.

2. Edging Size: [**3/16 inch (4.8 mm) thick by 5-1/2 inches (140 mm) deep**] [**3/16 inch (4.8 mm) thick by 4 inches (100 mm) deep**] [**1/8 inch (3.2 mm) thick by 5-1/2 inches (140 mm) deep**] [**1/8 inch (3.2 mm) thick by 4 inches (100 mm) deep**] <**Insert dimensions**>.

3. Stakes: Aluminum, ASTM B 221 (ASTM B 221M), Alloy 6061-T6, approximately 1-1/2 inches (38 mm) wide by 12 inches (300 mm) long.
4. Finish: [**Manufacturer's standard paint**] [**Powder-coat paint**] [**Mill (natural aluminum)**] [**Black anodized**].

    a. Paint Color: [**Black**] [**Green**] [**Brown**].

D. Plastic Edging: Standard black polyethylene or vinyl edging, [**V-lipped bottom**] [**horizontally grooved**] <**Insert configuration**>, extruded in standard lengths, with 9-inch (225-mm) [**steel angle**] [**plastic**] stakes.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

    a. Oly-Ola Edgings, Inc.
    b. Permaloc Corporation.
    c. Sure-loc Edging Corporation.
    d. Valley View Industries.
    e. Villa Root Barrier.
    f. <**Insert manufacturer's name**>.

2. Edging Size: [**0.1 inch (2.5 mm) thick by 5 inches (125 mm) deep**] [**0.07 inch (1.8 mm) thick by 5 inches (125 mm) deep**] <**Insert dimensions**>.
3. Top Profile: Straight, with top 2 inches (50 mm) being 1/4 inch (6.4 mm) thick.

4. Top Profile: Round top, [**1/2 inch (13 mm)**] [**1 inch (25 mm)**] in diameter.
5. Accessories: Manufacturer's standard alignment clips or plugs.

2.8 TREE-WATERING DEVICES

A. Watering Pipe: PVC pipe 4 inches (100 mm) in diameter, site-cut to length as required, and with snug-fitting removable cap.

B. Slow-Release Watering Device: Standard product manufactured for drip irrigation of plants and emptying its water contents over [**an extended time period**] [**two to nine hours**] [**two to three weeks**] <**Insert number or range**>; manufactured from UV-light-stabilized nylon-reinforced polyethylene sheet, PVC, or HDPE plastic.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

   a. BIO-PLEX.
   b. Engineered Watering Solutions; PQ Partners, LLC.
   c. Spectrum Products, Inc.
   d. <**Insert manufacturer's name**>.

2. Color: [**As selected by Architect from manufacturer's full range**] [**black**] [**dark chocolate**] [**green**] [**or**] [**tan**] <**Insert color**>.

2.9 MISCELLANEOUS PRODUCTS

A. Tree Guards: Manufacturer's standard tree guards.

1. Basis-of-Design Product: Subject to compliance with requirements, provide Neenah Foundry Company; Tree Guards or comparable product by one of the following:

   a. Barry Pattern & Foundry Co., Inc.
   b. Ironsmith Inc.
   c. <**Insert manufacturer's name**>.

2. Steel Fabricated Tree Guards: As indicated on the drawings; hot rolled steel of 0.5 inch (13 mm) and 0.625 inch (16 mm) square steel stock.

B. Tree Fences: Manufacturer's standard tree fences.

1. Basis if Design: Product: Subject to compliance with requirements, provide Neenah Foundry Company; Tree Fences or comparable product by one of the following Subject to compliance with requirements, provide products by one of the following:

   a. Barry Pattern & Foundry Co., Inc.
   b. Ironsmith Inc.

c. <**Insert manufacturer's name**>.

2. Cast Iron Tree Fences: ASTM A 48/A 48M, Class 35 (Class 250) or better, gray-iron castings with stainless steel hardware and stainless steel installation spikes.

C. Pressure-Preservative Treatment: AWPA U1, Use Category UC4a; acceptable to authorities having jurisdiction, and containing no arsenic or chromium.

D. Root Barrier: Black, molded, modular panels [**18 inches (457 mm)**] [**24 inches (610 mm)**] <**Insert dimension**> high (deep), 85 mils (2.2 mm) thick, and with vertical root deflecting ribs protruding 3/4 inch (19 mm) out from panel surface; manufactured with minimum 50 percent recycled polyethylene plastic with UV inhibitors.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. DeepRoot Green Infrastructure, LLC.
b. NDS Inc.
c. Villa Root Barrier.
d. <**Insert manufacturer's name**>.

E. Antidesiccant: Water-insoluble emulsion, permeable moisture retarder, film forming, for trees and shrubs. Deliver in original, sealed, and fully labeled containers and mix according to manufacturer's written instructions.

F. Burlap: Non-synthetic, biodegradable.

G. Planter Drainage Gravel: Washed, sound crushed stone or gravel complying with [**ASTM D 448 for Size No. 8**] <**Insert requirements**>.

H. Planter Filter Fabric: [**Woven**] [**Nonwoven**] geotextile manufactured for separation applications and made of polypropylene, polyolefin, or polyester fibers or combination of them.

I. Mycorrhizal Fungi: Dry, granular inoculant containing at least 5300 spores per lb (0.45 kg) of vesicular-arbuscular mycorrhizal fungi and 95 million spores per lb (0.45 kg) of ectomycorrhizal fungi, 33 percent hydrogel, and a maximum of 5.5 percent inert material.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas to receive plants, with Installer present, for compliance with requirements and conditions affecting installation and performance of the Work.

1. Verify that no foreign or deleterious material or liquid such as paint, paint washout, concrete slurry, concrete layers or chunks, cement, plaster, oils, gasoline, diesel fuel, paint thinner, turpentine, tar, roofing compound, or acid has been deposited in soil within a planting area.
2. Verify that plants and vehicles loaded with plants can travel to planting locations with adequate overhead clearance.
3. Suspend planting operations during periods of excessive soil moisture until the moisture content reaches acceptable levels to attain the required results.
4. Uniformly moisten excessively dry soil that is not workable or which is dusty.

B. If contamination by foreign or deleterious material or liquid is present in soil within a planting area, remove the soil and contamination as directed by Architect and replace with new planting soil.

C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities and turf areas and existing plants from damage caused by planting operations.

B. Install erosion-control measures to prevent erosion or displacement of soils and discharge of soil-bearing water runoff or airborne dust to adjacent properties and walkways.

C. Lay out individual tree and shrub locations and areas for multiple plantings. Stake locations, outline areas, adjust locations when requested, and obtain Architect's acceptance of layout before excavating or planting. Make minor adjustments as required.

D. Lay out plants at locations directed by Architect. Stake locations of individual trees and shrubs and outline areas for multiple plantings.

3.3 PLANTING AREA ESTABLISHMENT

A. General: Prepare planting area for soil placement and mix planting soil according to [**Section 329113 "Soil Preparation."**] [**Section 329115 "Soil Preparation (Performance Specification)."**]

B. Placing Planting Soil: [**Place and mix planting soil in-place over exposed subgrade**] [**Place manufactured planting soil over exposed subgrade**] [**Blend planting soil in place**] <**Insert requirement**>.

C. Before planting, obtain Architect's acceptance of finish grading; restore planting areas if eroded or otherwise disturbed after finish grading.

D. Application of Mycorrhizal Fungi: At time directed by Architect, broadcast dry product uniformly over prepared soil at application rate [**indicated on Drawings**] [**according to manufacturer's written recommendations**] <**Insert application rate**>.

3.4 EXCAVATION FOR TREES AND SHRUBS

A. Planting Pits and Trenches: Excavate circular planting pits.

1. Excavate planting pits with sides sloping inward at a 45-degree angle. Excavations with vertical sides are unacceptable. Trim perimeter of bottom leaving center area of bottom raised slightly to support root ball and assist in drainage away from center. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation.
2. Excavate approximately three times as wide as ball diameter for [**balled and burlapped**] [**balled and potted**] [**container-grown**] [**fabric bag-grown**] stock.
3. Excavate at least 12 inches (300 mm) wider than root spread and deep enough to accommodate vertical roots for bare-root stock.
4. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball.
5. If area under the plant was initially dug too deep, add soil to raise it to the correct level and thoroughly tamp the added soil to prevent settling.
6. Maintain angles of repose of adjacent materials to ensure stability. Do not excavate subgrades of adjacent paving, structures, hardscapes, or other new or existing improvements.
7. Maintain supervision of excavations during working hours.
8. Keep excavations covered or otherwise protected [**overnight**] [**after working hours**] [**when unattended by Installer's personnel**].
9. If drain tile is indicated on Drawings or required under planting areas, excavate to top of porous backfill over tile.

B. Backfill Soil: Subsoil and topsoil removed from excavations [**may**] [**may not**] be used as backfill soil unless otherwise indicated.

C. Obstructions: Notify Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

1. Hardpan Layer: Drill 6-inch- (150-mm-) diameter holes, 24 inches (600 mm) apart, into free-draining strata or to a depth of 10 feet (3 m), whichever is less, and backfill with free-draining material.

D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub planting pits.

E. Fill excavations with water and allow to percolate away before positioning trees and shrubs.

3.5 TREE, SHRUB, AND VINE PLANTING

A. Inspection: At time of planting, verify that root flare is visible at top of root ball according to ANSI Z60.1. If root flare is not visible, remove soil in a level manner from the root ball to where the top-most root emerges from the trunk. After soil removal to expose the root flare, verify that root ball still meets size requirements.

B. Roots: Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

C. Balled and Burlapped Stock: Set each plant plumb and in center of planting pit or trench with root flare [**1 inch (25 mm) above**] [**2 inches (50 mm) above**] <**Insert requirement**> adjacent finish grades.

1. Backfill: Planting soil <**Insert drawing designation**>.[**For trees, use excavated soil for backfill.**]
2. After placing some backfill around root ball to stabilize plant, carefully cut and remove burlap, rope, and wire baskets from tops of root balls and from sides, but do not remove from under root balls. Remove pallets, if any, before setting. Do not use planting stock if root ball is cracked or broken before or during planting operation.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.

   a. Quantity: [**As indicated on Drawings**] [**Two per plant**] [**Three for each caliper inch of plant**] <**Insert requirement**>.

5. Continue backfilling process. Water again after placing and tamping final layer of soil.

D. [**Balled and Potted**] [**and**] [**Container-Grown**] Stock: Set each plant plumb and in center of planting pit or trench with root flare [**1 inch (25 mm) above**] [**2 inches (50 mm) above**] <**Insert requirement**> adjacent finish grades.

1. Backfill: Planting soil <**Insert drawing designation**>.[**For trees, use excavated soil for backfill.**]
2. Carefully remove root ball from container without damaging root ball or plant.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.

a. Quantity: [**As indicated on Drawings**] [**Two per plant**] [**Three for each caliper inch of plant**] <**Insert requirement**>.

5. Continue backfilling process. Water again after placing and tamping final layer of soil.

E. Fabric Bag-Grown Stock: Set each plant plumb and in center of planting pit or trench with root flare [**1 inch (25 mm) above**] [**2 inches (50 mm) above**] <**Insert requirement**> adjacent finish grades.

1. Backfill: Planting soil <**Insert drawing designation**>.[**For trees, use excavated soil for backfill.**]
2. Carefully remove root ball from fabric bag without damaging root ball or plant. Do not use planting stock if root ball is cracked or broken before or during planting operation.
3. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
4. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside the root ball about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole.

   a. Quantity: [**As indicated on Drawings**] [**Two per plant**] [**Three for each caliper inch of plant**] <**Insert requirement**>.

5. Continue backfilling process. Water again after placing and tamping final layer of soil.

F. Bare-Root Stock: Set and support each plant in center of planting pit or trench with root flare [**1 inch (25 mm) above**] [**2 inches (50 mm) above**] <**Insert requirement**> adjacent finish grade.

1. Backfill: Planting soil <**Insert drawing designation**>.[**For trees, use excavated soil for backfill.**]
2. Spread roots without tangling or turning toward surface. Plumb before backfilling, and maintain plumb while working.
3. Carefully work backfill in layers around roots by hand. Bring roots into close contact with the soil.
4. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.
5. Place planting tablets equally distributed around each planting pit when pit is approximately one-half filled. Place tablets beside soil-covered roots about 1 inch (25 mm) from root tips; do not place tablets in bottom of the hole or touching the roots.

   a. Quantity: [**As indicated on Drawings**] [**Two per plant**] [**Three for each caliper inch of plant**] <**Insert requirement**>.

6. Continue backfilling process. Water again after placing and tamping final layer of soil.

G. Watering Pipe: During backfilling, install watering pipe 4 feet (1.25 m) deep into the planting pit outside the root ball [**as indicated on Drawings**] [**and**] [**with top of pipe 1 inch (25 mm) above the mulched surface**].

H. Slopes: When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

3.6 TREE, SHRUB, AND VINE PRUNING

A. Remove only dead, dying, or broken branches. Do not prune for shape.

B. Prune, thin, and shape trees, shrubs, and vines as directed by Architect.

C. Prune, thin, and shape trees, shrubs, and vines according to standard professional horticultural and arboricultural practices. Unless otherwise indicated by Architect, do not cut tree leaders; remove only injured, dying, or dead branches from trees and shrubs; and prune to retain natural character.

D. Do not apply pruning paint to wounds.

3.7 TREE STABILIZATION

A. Trunk Stabilization by Upright Staking and Tying: Install trunk stabilization as follows unless otherwise indicated:

1. Upright Staking and Tying: Stake trees of 2- through 5-inch (50- through 125-mm) caliper. Stake trees of less than 2-inch (50-mm) caliper only as required to prevent wind tip out. Use a minimum of two stakes of length required to penetrate at least 18 inches (450 mm) below bottom of backfilled excavation and to extend [**to the dimension indicated on Drawings**] [**at least 72 inches (1830 mm)**] [**one-third of trunk height**] <**Insert dimension or requirement**> above grade. Set vertical stakes and space to avoid penetrating root balls or root masses.
2. Upright Staking and Tying: Stake trees with two stakes for trees up to 12 feet (3.6 m) high and 2-1/2 inches (63 mm) or less in caliper; three stakes for trees less than 14 feet (4.2 m) high and up to 4 inches (100 mm) in caliper. Space stakes equally around trees.
3. Support trees with bands of flexible ties at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.
4. Support trees with two strands of tie wire, connected to the brass grommets of tree-tie webbing at contact points with tree trunk. Allow enough slack to avoid rigid restraint of tree.

B. Trunk Stabilization by Staking and Guying: Install trunk stabilization as follows unless otherwise indicated on Drawings. Stake and guy trees more than 14 feet (4.2 m) in height and more than 3 inches (75 mm) in caliper unless otherwise indicated.

1. Site-Fabricated, Staking-and-Guying Method: Install no fewer than three guys spaced equally around tree.

a. Securely attach guys to stakes 30 inches (760 mm) long, driven to grade. Adjust spacing to avoid penetrating root balls or root masses. Provide [**turnbuckle**] [**compression spring**] for each guy wire and tighten securely.
b. For trees more than [**6 inches (150 mm) in caliper**] <**Insert size**>, anchor guys to wood deadmen buried at least 36 inches (900 mm) below grade. Provide [**turnbuckle**] [**compression spring**] for each guy wire and tighten securely.
c. Support trees with bands of flexible ties at contact points with tree trunk and reaching to [**turnbuckle**] [**compression spring**]. Allow enough slack to avoid rigid restraint of tree.
d. Support trees with [**guy cable**] [**or**] [**multiple strands of tie wire**], connected to the brass grommets of tree-tie webbing at contact points with tree trunk and reaching to [**turnbuckle**] [**compression spring**]. Allow enough slack to avoid rigid restraint of tree.
e. Attach flags to each guy wire, 30 inches (760 mm) above finish grade.
f. Paint [**turnbuckles**] [**compression springs**] with luminescent white paint.

2. Proprietary Staking and Guying Device: Install staking and guying system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

C. Root-Ball Stabilization: Install at- or below-grade stabilization system to secure each new planting by the root ball unless otherwise indicated.

1. Wood Hold-Down Method: Place vertical stakes against side of root ball and drive them into subsoil; place horizontal wood hold-down stake across top of root ball and screw at each end to one of the vertical stakes.

a. Install stakes of length required to penetrate at least [**to the dimension indicated on Drawings**] [**18 inches (450 mm)**] <**Insert dimension**> below bottom of backfilled excavation. Saw stakes off at horizontal stake.
b. Install screws through horizontal hold-down and penetrating at least 1 inch (25 mm) into stakes. Predrill holes if necessary to prevent splitting wood.
c. Install second set of stakes on other side of root trunk for larger trees.

2. Proprietary Root-Ball Stabilization Device: Install root-ball stabilization system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

D. Palm Bracing: Install bracing system at three or more places equally spaced around perimeter of trunk to secure each palm until established unless otherwise indicated.

1. Site-Fabricated Palm-Bracing Method:

   a. Place battens over padding and secure battens in place around trunk perimeter with at least two straps, tightened to prevent displacement. Ensure that straps do not contact trunk.
   b. Place diagonal braces and cut to length. Secure upper ends of diagonal braces with galvanized nails into battens or into nail-attached blocks on battens. Do not drive nails, screws, or other securing devices into palm trunk; do not penetrate palm trunk in any fashion. Secure lower ends of diagonal braces with stakes driven into ground to prevent outward slippage of braces.

2. Proprietary Palm-Bracing Device: Install palm-bracing system sized and positioned as recommended by manufacturer unless otherwise indicated and according to manufacturer's written instructions.

3.8 ROOT-BARRIER INSTALLATION

A. Install root barrier where trees are planted within [**60 inches (1500 mm)**] [**48 inches (1200 mm)**] <**Insert dimension**> of paving or other hardscape elements, such as walls, curbs, and walkways, unless otherwise indicated on Drawings.

B. Align root barrier [**vertically**] [**with bottom edge angled at 20 degrees away from the paving or other hardscape element**], and run it linearly along and adjacent to the paving or other hardscape elements to be protected from invasive roots.

C. Install root barrier continuously for a distance of [**60 inches (1500 mm)**] <**Insert dimension**> in each direction from the tree trunk, for a total distance of [**10 feet (3 m)**] <**Insert dimension**> per tree. If trees are spaced closer, use a single continuous piece of root barrier.

   1. Position top of root barrier [**flush with finish grade**] [**1/2 inch (13 mm) above finish grade**] [**according to manufacturer's written recommendations**].
   2. Overlap root barrier a minimum of 12 inches (300 mm) at joints.
   3. Do not distort or bend root barrier during construction activities.
   4. Do not install root barrier surrounding the root ball of tree.

3.9 PLACING SOIL IN PLANTERS

A. Place a layer of drainage gravel at least 4 inches (100 mm) thick in bottom of planter. Cover bottom with filter fabric and wrap filter fabric [**4 inches (100 mm)**] [**6 inches (150 mm)**] <**Insert dimension**> up on all sides. Duct tape along the entire top edge of the filter fabric, to secure the filter fabric against the sides during the soil-filling process.

B. Fill planter with planting soil <**Insert drawing designation**>. Place soil in lightly compacted layers to an elevation of 1-1/2 inches (38 mm) below top of planter, allowing natural settlement.

3.10 GROUND COVER AND PLANT PLANTING

A. Set out and space ground cover and plants other than trees, shrubs, and vines [**9 inches (225 mm) apart**] [**12 inches (300 mm) apart**] [**18 inches (450 mm) apart**] [**24 inches (600 mm) apart**] [**as indicated on Drawings**] in even rows with triangular spacing.

B. Use planting soil <**Insert drawing designation**> for backfill.

C. Dig holes large enough to allow spreading of roots.

D. For rooted cutting plants supplied in flats, plant each in a manner that minimally disturbs the root system but to a depth not less than two nodes.

E. Work soil around roots to eliminate air pockets and leave a slight saucer indentation around plants to hold water.

F. Water thoroughly after planting, taking care not to cover plant crowns with wet soil.

G. Protect plants from hot sun and wind; remove protection if plants show evidence of recovery from transplanting shock.

3.11 PLANTING AREA MULCHING

A. Install weed-control barriers before mulching according to manufacturer's written instructions. Completely cover area to be mulched, overlapping edges a minimum of [**6 inches (150 mm)**] [**12 inches (300mm)**] and secure seams with galvanized pins.

B. Mulch backfilled surfaces of planting areas and other areas indicated.

1. Trees[**and Treelike Shrubs**] in Turf Areas: Apply [**organic**] [**mineral**] mulch ring of [**2-inch (50-mm)**] [**3-inch (75-mm)**] <**Insert dimension**> average thickness, with [**12-inch (300-mm)**] [**24-inch (600-mm)**] [**36-inch (900-mm)**] <**Insert dimension**> radius around trunks or stems. Do not place mulch within [**3 inches (75 mm)**] [**6 inches (150 mm)**] <**Insert distance**> of trunks or stems.
2. Organic Mulch in Planting Areas: Apply [**2-inch (50-mm)**] [**3-inch (75-mm)**] <**Insert dimension**> average thickness of organic mulch [**extending 12 inches (300 mm) beyond edge of individual planting pit or trench**] [**and**] [**over whole surface of planting area**], and finish level with adjacent finish grades. Do not place mulch within [**3 inches (75 mm)**] [**6 inches (150 mm)**] <**Insert distance**> of trunks or stems.
3. Mineral Mulch in Planting Areas: Apply [**2-inch (50-mm)**] [**3-inch (75-mm)**] <**Insert dimension**> average thickness of mineral mulch [**extending 12 inches (300 mm)**

beyond edge of individual planting pit or trench] [**and**] [**over whole surface of planting area**], and finish level with adjacent finish grades. Do not place mulch within [**3 inches (75 mm)**] [**6 inches (150 mm)**] <**Insert distance**> of trunks or stems.

3.12 EDGING INSTALLATION

A. Wood Edging: Install edging where indicated.[**Mitre cut joints and connections at a 45-degree angle.**] Fasten each cut joint or connection with two galvanized nails. Anchor with wood stakes spaced up to 36 inches (900 mm) apart, driven at least 1 inch (25 mm) below top elevation of edging. Use two galvanized nails per stake to fasten edging, of length as needed to penetrate both edging and stake and provide 1/2-inch (13-mm) clinch at point. Predrill stakes if needed to avoid splitting. Replace stakes that crack or split during installation process.

B. Steel Edging: Install steel edging where indicated according to manufacturer's written instructions. Anchor with steel stakes spaced approximately 30 inches (760 mm) apart, driven below top elevation of edging.

C. Aluminum Edging: Install aluminum edging where indicated according to manufacturer's written instructions. Anchor with aluminum stakes spaced approximately [**36 inches (900 mm)**] [**48 inches (1200 mm)**] apart, driven below top elevation of edging.

D. Plastic Edging: Install plastic edging where indicated according to manufacturer's written instructions. Anchor with steel stakes spaced approximately [**36 inches (900 mm)**] [**48 inches (1200 mm)**] apart, driven through upper base grooves or V-lip of edging.

E. Shovel-Cut Edging: Separate mulched areas from turf areas[**, curbs, and paving**] with a 45-degree, 4- to 6-inch- (100- to 150-mm-) deep, shovel-cut edge[**as indicated on Drawings**].

F. Mow-Strip Installation:

1. Excavate for mow strip[**as indicated on Drawings**].
2. Compact subgrade uniformly beneath mow strip.
3. Apply nonselective, pre-emergent herbicide that inhibits growth of grass and weeds.
4. Install [**wood**] [**steel**] [**aluminum**] [**plastic**] edging, delineating the edge of mow strip.
5. Install weed-control barrier before mulching, covering area of mow strip, and overlapping and pinning edges of barrier at least 6 inches (150 mm) and according to manufacturer's written instructions.
6. Place indicated thickness of [**organic**] [**mineral**] mulch, fully covering weed barrier.
7. Rake mulch to a uniform surface level with adjacent finish grades.

3.13 PLANT MAINTENANCE

A. Maintain plantings by pruning, cultivating, watering, weeding, fertilizing, mulching, restoring planting saucers, adjusting and repairing tree-stabilization devices, resetting to proper grades

or vertical position, and performing other operations as required to establish healthy, viable plantings.

B. Fill in, as necessary, soil subsidence that may occur because of settling or other processes. Replace mulch materials damaged or lost in areas of subsidence.

C. Apply treatments as required to keep plant materials, planted areas, and soils free of pests and pathogens or disease. Use integrated pest management practices when possible to minimize use of pesticides and reduce hazards. Treatments include physical controls such as hosing off foliage, mechanical controls such as traps, and biological control agents.

3.14 PESTICIDE APPLICATION

A. Apply pesticides and other chemical products and biological control agents according to authorities having jurisdiction and manufacturer's written recommendations. Coordinate applications with Owner's operations and others in proximity to the Work. Notify Owner before each application is performed.

B. Pre-Emergent Herbicides (Selective and Nonselective): Apply to tree, shrub, and ground-cover areas according to manufacturer's written recommendations. Do not apply to seeded areas.

C. Post-Emergent Herbicides (Selective and Nonselective): Apply only as necessary to treat already-germinated weeds and according to manufacturer's written recommendations.

3.15 REPAIR AND REPLACEMENT

A. General: Repair or replace existing or new trees and other plants that are damaged by construction operations, in a manner approved by Architect.

1. Submit details of proposed pruning and repairs.
2. Perform repairs of damaged trunks, branches, and roots within 24 hours, if approved.
3. Replace trees and other plants that cannot be repaired and restored to full-growth status, as determined by Architect.

B. Remove and replace trees that are more than [**25**] <**Insert number**> percent dead or in an unhealthy condition[**before the end of the corrections period**] or are damaged during construction operations that Architect determines are incapable of restoring to normal growth pattern.

1. Provide new trees of same size as those being replaced for each tree of [**6 inches (150 mm)**] [**4 inches (100 mm)**] <**Insert dimension**> or smaller in caliper size.
2. Provide [**one**] [**two**] <**Insert number**> new tree(s) of [**6-inch (150-mm)**] [**4-inch (100-mm)**] <**Insert dimension**> caliper size for each tree being replaced that measures more than [**6 inches (150 mm)**] [**4 inches (100 mm)**] in caliper size.

3. Species of Replacement Trees: [**Same species being replaced**] [**Species selected by Architect**] <**Insert species**>.

3.16 CLEANING AND PROTECTION

A. During planting, keep adjacent paving and construction clean and work area in an orderly condition. Clean wheels of vehicles before leaving site to avoid tracking soil onto roads, walks, or other paved areas.

B. Remove surplus soil and waste material including excess subsoil, unsuitable soil, trash, and debris and legally dispose of them off Owner's property.

C. Protect plants from damage due to landscape operations and operations of other contractors and trades. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged plantings.

D. After installation and before [**Substantial Completion**] <**Insert time**>, remove nursery tags, nursery stakes, tie tape, labels, wire, burlap, and other debris from plant material, planting areas, and Project site.

E. At time of Substantial Completion, verify that tree-watering devices are in good working order and leave them in place. Replace improperly functioning devices.

3.17 MAINTENANCE SERVICE

A. Maintenance Service for Trees and Shrubs: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:

1. Maintenance Period: [**12**] [**Six**] [**Three**] months from date of [**planting completion**] [**Substantial Completion**] <**Insert starting time**>.

B. Maintenance Service for Ground Cover and Other Plants: Provide maintenance by skilled employees of landscape Installer. Maintain as required in "Plant Maintenance" Article. Begin maintenance immediately after plants are installed and continue until plantings are acceptably healthy and well established, but for not less than maintenance period below:

1. Maintenance Period: [**Six**] [**Three**] months from date of [**planting completion**] [**Substantial Completion**] <**Insert starting time**>.

END OF SECTION 32 93 00

SECTION 33 11 00 - BURIED WATER AND SANITARY SEWER PIPING

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified and required to install and test all buried piping, fittings, and specials. The Work includes, but is not limited to, the following:
   a. All types and sizes of buried piping, except those specified under other Sections or other contracts.
   b. Piping beneath structures.
   c. Supports, restraints, and thrust blocks.
   d. Pipe encasements.
   e. Work on or affecting existing piping.
   f. Testing.
   g. Cleaning and disinfecting.
   h. Installation of all jointing and gasketing materials, specials, flexible couplings, mechanical couplings, harnessed and flanged adapters, sleeves, tie rods, and all other Work required to complete the buried piping installation.
   i. Incorporation of valves, meters and special items shown or specified into the piping systems as required and as specified in the appropriate Division 22 and 33 Sections.
   j. Unless otherwise specifically shown, specified, or included under other Sections, all buried piping Work required, beginning at the outside face of structures or structure foundations and extending away from structure.

B. Coordination:

1. Review installation procedures under other Sections and other contracts and coordinate with the Work that is related to this Section.

C. Related Sections:

1. Section 02220, Excavation and Backfill.
2. Section 03 30 00, Cast-In-Place Concrete.
3. Section 09 91 00, Painting.
4. Division 22 and 33, Sections on Piping, Valves and Appurtenances.

1.2 QUALITY ASSURANCE

A. Requirements of Regulatory Agencies:

1. Comply with requirements of NFPA Standard No. 24 for "Outside Protection"
   where applicable to water pipe systems used for fire protection.

2. Comply with requirements of UL, FM and other jurisdictional authorities, where applicable.
3. Refer to the General and Supplementary Conditions regarding permit requirements for this Project.

B. Reference Standards: Comply with applicable provisions and recommendations of the following, except as otherwise shown or specified.
1. ASTM D 2321, Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
2. ASTM D 2774, Practice for Underground Installation of Thermoplastic Pressure Piping.
3. AWWA C105, Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids.
4. AWWA C111, Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
5. AWWA C600, Installation of Ductile-Iron Water Mains and Their Appurtenances.
6. AWWA C606, Grooved and Shouldered Joints.
7. AWWA C651, Disinfecting Water Mains.
8. AWWA M23, PVC - Design and Installation.
9. ASCE MOP No. 37, Design and Construction of Sanitary and Storm Sewers.
10. NFPA 24, Private Fire Service Mains and Their Appurtenances.

1.3 SUBMITTALS

A. Shop Drawings: Submit for approval the following:
1. Full details of piping, specials, manholes, joints, harnessing and thrust blocks, and connections to existing piping, structures, equipment and appurtenances.

B. Tests: Submit description of proposed testing methods, procedures and apparatus. Prepare and submit report for each test.

C. Certificates: Submit certificates of compliance with referenced standards.

D. Record Drawings:
1. Submit record drawings prior to the time of Substantial Completion.

1.4 PRODUCT STORAGE AND HANDLING

A. Handle all pipe, fittings, specials and accessories carefully with approved handling devices. Do not drop or roll material off trucks. Do not otherwise drop, roll or skid piping.

B. Store pipes and fittings on heavy wood blocking or platforms so they are not in contact with the ground.

C. Unload pipe, fittings and specials opposite to or as close to the place where they are to be installed as is practical to avoid unnecessary handling. Keep pipe interiors completely free from dirt and foreign matter.

D. Inspect delivered pipe for cracked, gouged, chipped, dented or other damaged material and immediately remove from site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Approved pipe materials are listed in the Piping Schedule. Refer to applicable Sections for material specifications.

B. General:

1. Marking Piping:

a. Clearly mark each piece of pipe or fitting with a designation conforming to those shown on the laying schedule.

b. Cast or paint material, type and pressure designation on each piece of pipe or fitting 4 inches in diameter and larger.

c. Pipe and fittings smaller than 4 inches in diameter shall be clearly marked by manufacturer as to material, type and rating.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Install piping as shown, specified and as recommended by the manufacturer.

2. If there is a conflict between manufacturer's recommendations and the Drawings or Specifications, request instructions from OCWS before proceeding

3. All trench excavations shall be inspected by OCWS prior to laying pipe. Notify OCWS in advance of excavating, bedding and pipe laying operations.

4. Minimum cover over piping shall be 3 feet unless otherwise shown or approved by OCWS.

5. Earthwork required is specified in the applicable Sections of Division 2.

6. Excavation in excess of that required or shown and which is not authorized by OCWS shall be replaced at CONTRACTOR'S expense with approved granular material. It shall be furnished, placed and compacted in accordance with the requirements of the applicable Section of Division 2.

B. Manufacturer's Installation Specialist:

1. Provide the services of a competent installation specialist of the pipe manufacturer when pipe laying commences for the following:

a. Thermoplastic pipe.

2. Retain installation specialist at the site until competency of the pipe laying crew has been satisfactorily demonstrated.

C. Separation of Sewers and Potable Water Pipe Lines:

1. Horizontal and Vertical Separation:

a. Wherever possible, existing and proposed potable water mains and service lines, and sanitary and storm sewers shall be separated

horizontally by a clear distance of not less than 10 feet.

b. If local conditions preclude a clear horizontal separation of not less 10 feet, the installation will be permitted provided the potable water main is in a separate trench or on a undistributed earth shelf located on one side of the sewer and at an elevation so the bottom of the potable water main is at least 18 inches above the top of the sewer.

c. Exception:

1) Where it is not possible to provide the minimum horizontal and vertical separation described above, both the potable water main and sewer must be constructed of cement lined ductile iron slip-on or mechanical joint pipe complying with public water supply design standards of the agency. Both pipes shall be pressure tested in accordance with the requirements of the buried piping schedule, but in no case less than 150 psi, to assure water tightness before backfilling.

D. Crossings:

a. Provide a minimum vertical distance of 18 inches between the outside of the potable water main and the outside of the sewer when a sewer or drain must cross over a potable water main.

b. Center one full length section of potable water main over the sewer so that the sewer joints will be equidistant from the potable water main joints.

c. Provide adequate structural support where a potable water main crosses under a sewer to maintain line and grade.

d. Exceptions:

1) Where it is not possible to provide the minimum horizontal and vertical separation described above, both the potable water main and sewer must be constructed of cement lined ductile iron pipe. Both pipes shall be pressure tested in accordance with the requirements of the buried piping schedule, but in no case less than 150 psi, to assure water tightness before backfilling.

2) Encase either potable water main or sewer in a watertight carrier pipe, which extends 10 feet on both sides of the crossing, measured perpendicular to the potable water main.

E. Plugs:

1. Temporarily plug installed pipe at the end of each day's work or other interruption to the installation of any pipe line. Plugging shall prevent the entry of animals, liquids or persons into the pipe or the entrance or insertion of deleterious materials.

2. Install standard plugs into all bells at dead ends, tees or crosses. Cap all spigot ends.

3. Fully secure and block all plugs and caps installed for pressure testing to withstand the specified test pressure.

4. Where plugging is required for phasing of the Work or for subsequent connection of piping, install watertight, permanent type plugs.

F. Bedding Pipe: Bed pipe as specified below and in accordance with the details

shown.

1. Trench excavation and backfill, and bedding materials shall conform to the requirements of specifications and drawings, as applicable.
2. Where the existing bedding material is deemed unsuitable by OCWS, remove and replace it with approved granular materials.
3. Where pipe is installed in rock excavation, provide a minimum of 3 inches of crushed stone or gravel under pipes smaller than 4 inches in diameter and a
minimum of 6 inches of crushed stone or gravel under pipes 4 inches in diameter and larger.
4. Excavate trenches below the pipe bottom by an amount shown and specified. Remove all loose and unsuitable material from the trench bottom.
5. Carefully and thoroughly compact all pipe bedding with hand held pneumatic compactors.
6. Do not lay pipe until OCWS approves the bedding condition. If a conflict exists obtain clarification from OCWS before proceeding.
7. No pipe shall be brought into position until the preceding length has been bedded and secured in its final position.

G. Laying Pipe:

1. Conform to manufacturer's instructions and requirements of the standards listed below, where applicable:
   a. Ductile Iron Pipe: AWWA C600, AWWA C105.
   b. Thermoplastic Pipe: ASTM D 2774.
   c. ASCE Manual of Practice No. 37.
2. Install all pipe accurately to line and grade shown unless otherwise approved by OCWS. Remove and relay pipes that are not laid correctly.
3. Slope piping uniformly between elevations shown.
4. Ensure that ground water level in trench is at least 6 inches below bottom of pipe before laying piping. Do not lay pipe in water. Maintain dry trench conditions until jointing and backfilling are complete and protect and keep clean water pipe interiors, fittings and valves.
5. Start laying pipe at lowest point and proceed towards the higher elevations, unless otherwise approved by OCWS.
6. Place bell and spigot pipe so that bells face the direction of laying, unless otherwise approved by OCWS.
7. Excavate around joints in bedding and lay pipe so that the barrel bears uniformly on the trench bottom.
8. Deflections at joints shall not exceed 75 percent of the amount allowed by the pipe manufacturer.
9. For thermoplastic piping, snake piping in trench to compensate for thermal expansion.
10. Carefully examine all pipe, fittings and specials for cracks, damage or other defects while suspended above the trench before installation. Immediately remove defective materials from site.
11. Inspect interior of all pipe and fittings and completely clean all dirt, gravel, sand, debris or other foreign material from pipe interior and joint recesses before it is moved into the trench. Bell and spigot mating

surfaces shall be thoroughly wire brushed, and wiped clean and dry immediately before the pipe is laid.

12. Field cut pipe, where required, with a machine specially designed for cutting piping. Make cuts carefully, without damage to pipe or lining, and with a smooth end at right angles to the axis of pipe. Cut ends on push-on joint shall be tapered and sharp edges filed off smooth. Flame cutting will not be allowed.
13. Blocking under piping will not be permitted unless specifically approved by OCWS for special conditions. If permitted, conform to requirements of AWWA C600.
14. Touch up protective coatings in a satisfactory manner prior to backfilling.
15. CONTRACTOR shall notify OCWS in advance of backfilling operations.
16. On steep slopes, take measures acceptable to OCWS to prevent movement of the pipe during installation.
17. Thrust Restraint: During the installation of the pipe, thrust blocks, tied joints, or proprietary restrained joint systems shall be provided wherever required for thrust restraint. Thrust restraint shall conform to the applicable requirements of Article 3.2.

H. Polyethylene Encasement:

1. Provide polyethylene encasement for ductile iron piping to prevent contact between the pipe and surrounding bedding material and backfill.
2. Polyethylene may be supplied in tubes or in sheet material.
3. Polyethylene encasement materials and installation shall be in accordance with the requirements of AWWA C105.

I. Jointing Pipe:

1. Ductile Iron Mechanical Joint Pipe:
   a. Wipe clean the socket, plain end and adjacent areas immediately before making joint. Make certain that cut ends are tapered and sharp edges are filed off smooth.
   b. Lubricate the plain ends and gasket with soapy water or an approved pipe lubricant, in accordance with AWWA C111, just prior to slipping the gasket onto the plain end of the joint assembly.
   c. Place the gland on the plain end with the lip extension toward the plain end, followed by the gasket with the narrow edge of the gasket toward the plain end.
   d. Insert the pipe into the socket and press the gasket firmly and evenly into the gasket recess. Keep the joint straight during assembly.
   e. Push gland toward socket and center it around pipe with the gland lip against the gasket.
   f. Insert bolts and hand tighten nuts.
   g. Make deflection after joint assembly, if required, but prior to tightening bolts. Alternately tighten bolts 180 degrees apart to seat the gasket evenly. The bolt torque shall be as follows:

Pipe Size (inches)	Bolt Size (inches)	Range of Torque (ft-lbs)

3	5/8	45-60
4-24	3/4	75-90
30-36	1	100-120
42-48	1-1/4	120-150

2. Ductile Iron Push-On Joint Pipe:
   a. Prior to assembling the joints, the last 8 inches of the exterior surface of the spigot and the interior surface of the bell shall be thoroughly cleaned with a wire brush, except where joints are lined or coated with a special protective lining or coating.
   b. Rubber gaskets shall be wiped clean and flexed until resilient. Refer to manufacturer's instructions for procedures to ensure gasket resiliency when assembling joints in cold weather.
   c. Insert gasket into joint recess and smooth out the entire circumference of the gasket to remove bulges and to prevent interference with the proper entry of the spigot of the entering pipe.
   d. Immediately prior to joint assembly, apply a thin film of approved lubricant to the surface of the gasket, which will come in contact with the entering spigot end of pipe. CONTRACTOR may, at his option, apply a thin film of lubricant to the outside of the spigot of the entering pipe.
   e. For assembly, center spigot in the pipe bell and push pipe forward until it just makes contact with the rubber gasket. After gasket is compressed and before pipe is pushed or pulled all the way home, carefully check the gasket for proper position around the full circumference of the joint. Final assembly shall be made by forcing the spigot end of the entering pipe past the rubber gasket until it makes contact with the base of the bell. When more than a reasonable amount of force is required to assemble the joint, the spigot end of the pipe shall be removed to verify the proper positioning of the rubbergasket. Gaskets, which have been scoured or otherwise damaged, shall not be used.
   f. Maintain an adequate supply of gaskets and joint lubricant at the site at all times when pipe jointing operations are in progress.
3. Proprietary Joints:
   a. Pipe which utilizes proprietary joints such as Fastite, by American Cast Iron Pipe Company, Tyton by U.S. Pipe Incorporated, restrained joints described under Paragraph 3.2.D., or other such joints shall be installed in strict accordance with the manufacturer's instructions.
4. Flanged Joints:
   a. Assemble flanged joints using 1/8-inch ring-type gaskets for raised face flanges. Use full face gaskets for flat face flanges, unless otherwise approved by OCWS. Gaskets shall be suitable for the service intended in accordance with the manufacturer's ratings and instructions. Gaskets shall be properly centered.
   b. Bolts shall be tightened in a sequence, which will insure equal distribution of bolt loads.
   c. The length of bolts shall be uniform, and they shall not project beyond

the nut more than 1/4-inch or fall short of the nut when fully taken up. The ends of bolts shall be machine cut so as to be neatly rounded. No washers shall be used.

d. Bolt threads and gasket faces for flanged joints shall be lubricated prior to assembly.

e. After assembly, coat all bolts and nuts with two 8-mil coats of a high-build epoxy or bituminous coating as manufactured by Tnemec, or equal.

5. Thermoplastic Pipe Joints:

a. Solvent Cement Joints:

1) Bevel pipe ends and remove all burrs before making joints. Clean both pipe and fittings thoroughly. Do not attempt to make solvent cement joints if temperature is below 40 F nor in wet conditions.

2) Use solvent cement supplied or recommended by the pipe manufacturer.

3) Apply joint primer and solvent cement and assemble joints in strict accordance with the recommendations and instructions of the manufacturer of the joint materials and the pipe manufacturer.

4) Observe safety precautions with the use of joint primers and solvent cements. Allow air to circulate freely through pipelines to permit solvent vapors to escape. Slowly admit water when flushing or filling pipelines to prevent compression of gases within pipes.

b. Push-On Joints:

1) Bevel all field-cut pipe, remove all burrs and provide a reference mark the correct distance from the pipe end.

J. Clean the pipe end and the bell thoroughly before making the joint. Insert the O-ring gasket, making certain it is properly oriented. Lubricate the spigot well with an approved lubricant; do not lubricate the bell or O-ring. Insert the spigot end of the pipe carefully into the bell until the reference mark on the spigot is flush with the bell.Backfilling:

1. Conform to the applicable requirements of Section 02220 or 02223.

2. Place backfill as construction progresses. Backfill by hand and use power tampers until pipe is covered by at least one foot of fill.

K. Connections to Valves and Hydrants:

1. Install valves and hydrants as shown.

2. Provide suitable adapters when valves or hydrants and piping have different joint types.

3. Provide thrust restraint at all hydrants and at valves at pipeline terminations.

L. Transitions from One Type of Pipe to Another:

1. Provide all necessary adapters, specials and connection pieces required when connecting different types and sizes of pipe or connecting pipe made by different manufacturers.

M. Closures:

1. Provide all closure pieces shown or required to complete the Work.

3.2 THRUST RESTRAINT

A. Provide thrust restraint on all pressure piping systems and where otherwise shown and specified.

B. Thrust restraint may be accomplished by means of restrained pipe joints, or by concrete thrust blocks. Thrust restraints shall be designed for the axial thrust exerted by the test pressure specified in the "Buried Piping Schedule".

C. Place concrete thrust blocks against undisturbed soil. Where undisturbed soil does not exist, or for projects where the site consists of fill material, thrust restraint shall be provided by restrained pipe joints.

D. Restrained Pipe Joints:

1. Pipe joints shall be restrained by means suitable for the type of pipe being installed.

a. Restrain ductile iron push-on joints and mechanical joints utilizing a proprietary restrained joint system such as American Lok-Ring, Lok-Fast, Lok-Set; U.S. Pipe Field Lok Gasket, U.S. Pipe TR Flex System; lugs and tie rods, or other systems approved by OCWS.

b. Where push-on type or other non-restrained joints are utilized for thermoplastic piping, CONTRACTOR shall provide tie rods or other suitable joint restraint system, subject to the approval of OCWS.

E. Concrete Thrust Blocks:

1. Provide concrete thrust blocks on pressure piping at all changes in alignment of 15 degrees or more, at all tees, plugs and caps and where shown. Construct thrust blocks of Class B concrete.

2. Install thrust blocks against undisturbed soil. Place concrete so that pipe and fitting joints will be accessible for repair.

3. Size concrete thrust blocks as shown or as approved by OCWS.

3.3 WORK AFFECTING EXISTING PIPING

A. Location of Existing Piping:

1. Locations of existing piping shown should be considered approximate.

2. CONTRACTOR shall determine the true location of existing piping to which connections are to be made, and location of other facilities which could be disturbed during earthwork operations, or which may be affected by CONTRACTOR'S Work in anyway.

3. Conform to applicable requirements of Division 1 pertaining to cutting and patching, and connections to existing facilities.

B. Taking Existing Pipelines Out of Service:

1. Do not take pipelines out of service unless approved by OCWS.

2. Notify OCWS at least 48 hours prior to taking pipeline out of service.

C. Work on Existing Pipelines:

1. Cut or tap pipes as shown or required with machines specifically designed for this work.

2. Install temporary plugs to prevent entry of mud, dirt, water and debris.

3. Provide all necessary adapters, fittings, pipe and appurtenances required to complete the Work.

3.4 TESTING OF PIPING

A. General:
1. Test all piping except as may be exempted in the Schedule.
2. Notify OCWS and local authorities having jurisdiction at least 48 hours in advance of testing if their presence is required.
3. Conduct all tests in the presence of OCWS.
4. Remove or protect any pipeline-mounted devices which may be damaged by the test pressure.
5. Provide all apparatus and services required for testing, including but not limited to, the following:
   a. Test pumps, bypass pumps, hoses, calibrated gauges, meters, test containers, valves and fittings.
   b. Temporary bulkheads, bracing, blocking and thrust restraints.
6. Provide air if an air test is required and power if pumping is required.
7. Unless otherwise approved by OCWS, CONTRACTOR will provide fluid required for testing.
8. Repair observed leaks and any pipeline failing to meet acceptance criteria. Retest after repair.

B. Test Schedule:
1. Refer to the Piping Schedule for the type of test required and the required hydrostatic test pressure.
2. Unless otherwise specified, the required hydrostatic test pressures are at the lowest elevation of the pipeline.
3. For piping not listed in the Schedule:
   a. Hydrostatically test pipe that will be operating at a pressure greater than 5 psig.
   b. Use exfiltration testing or low-pressure air testing for all other piping.
4. Hydrostatic Test Pressure:
   a. Use test pressures listed in the Schedule.
   b. If a test pressure is not listed in the Schedule, or if a hydrostatic test is required for piping not listed in the Schedule, the test pressure will be determined by the OCWS based on the maximum anticipated sustained operating pressure and the methods described in the AWWA Manual or Standard which applies to the piping system.

C. Hydrostatic Testing:
1. Preparation for Testing:
   a. For plastic pipe, follow procedures described in Section 7 of AWWA Standard C605.
   b. Ensure that adequate thrust protection is in place and that all joints are properly installed.
   c. Special requirements:
2. Test Procedure:
   a. Fill pipeline slowly to minimize air entrapment and surge pressures. Fill rate should not exceed one foot per second in the pipe being tested.
   b. Examine exposed joints and valves, and correct visible leakage.
   c. After the wetting period prescribed above, add fluid to pressurize line

to the required test pressure. Maintain test pressure for a stabilization period of 10 minutes before beginning test.

d. After the stabilization period, maintain test pressure for a two-hour period. Add fluid to restore test pressure if pressure drops 5 psi below test pressure at any time during the test period.

e. Pump from a test container to maintain test pressure. Measure the volume of fluid pumped from the container and record on the test report. Record pressure at the test pump at 15 minute intervals for the duration of the test.

3. Allowable Leakage Rates: Leakage is defined as the quantity of fluid that must be supplied to the pipeline or any section thereof to maintain pressure within 5 psi of the test pressure during a two-hour period. The two-hour test period shall not begin until after the pipe has been filled, exposed to the required wetting period, air has been expelled and pressure has been stabilized. Allowable leakage rates for piping system are listed below:

a. No Leakage: Pipe with flanged or fused joints.

b. Rates based on the formula or table in AWWA Manual M41:

1) Metal pipe joined with rubber gaskets as sealing members. This includes the following joint types:

- Push-on joints.
- Mechanical joints.
- Bolted sleeve type couplings.
- Grooved and shouldered couplings.

c. Rates based on the formula or table in AWWA Standard 605:

1) Plastic pipe joined with O-ring gasket sealing members.

D. Exfiltration Testing:

1. Plug and bulkhead the section of pipe to be tested at both ends and admit fluid until the pipe is full.

2. Provide a minimum head of 2 feet above the crown of the pipe at the upstream end.

3. Add fluid from a test container or from a metered supply as required to maintain the level within 3 inches of the minimum head throughout the test duration.

4. Test duration shall not be less than 2 hours.

5. Allowable Leakage Rates:

a. Leakage is defined as the quantity of fluid that must be supplied to the pipeline or any section thereof to maintain the head within 3 inches of the test elevation during the test duration after the pipe has been filled and exposed to the required wetting period plus the quantity required to refill to the original head.

b. Leakage shall not be greater than that allowed by the regulatory agency having jurisdiction.

E. Low Pressure Air Testing:

1. Test in accordance with requirements of the regulatory agency.

2. If there are no regulatory requirements use test procedures described in ASTM Standards:

a. ASTM F1417 – For thermoplastic pipe.

3.5 CLEANING AND DISINFECTION

A. Cleaning:
   1. Thoroughly clean all piping and flush in a manner approved by OCWS, prior to placing in service.
   2. If piping which requires disinfection has not been kept clean during storage or installation, CONTRACTOR shall swab each section individually before installation with a five percent hypochlorite solution, to ensure clean piping.

B. Disinfection:
   1. Disinfect all potable and finished water piping.
   2. A suggested procedure for accomplishing complete and satisfactory disinfection is specified below. Other procedures will be considered for approval by OCWS.
      a. Thoroughly flush piping prior to disinfection with water.
      b. Conform to procedures described in AWWA C651. Continuous feed method of disinfecting shall be used unless alternative method is acceptable to OCWS.
   3. Water for initial flushing, testing and chlorination will be furnished by the CONTRACTOR. CONTRACTOR shall provide all temporary piping, hose,
      valves, appurtenances and services required. Cost of water required for redisinfection will be paid by CONTRACTOR to OWNER at OWNER'S standard rates.
   4. Chlorine will be supplied by CONTRACTOR.
   5. Bacteriologic tests will be performed by OWNER. A certified test laboratory report will be made available to CONTRACTOR, if requested.
   6. Chlorine concentration in the water entering the piping shall be between 50 and 100 parts per million, such that a minimum residual concentration of 25 mg/l will be left after a 24-hour retention period. Care shall be taken to ensure disinfection of the piping in all its parts. The operation shall be repeated as necessary to provide complete disinfection.
   7. After the required retention period, the heavily chlorinated water shall be flushed to drain, unless otherwise directed.

3.6 PIPING SCHEDULE

Service	Size	Material	Interior Lining	Exterior Coating	Pressure Class	Joint	Test	Remarks
PW	4"-12"	D.I.	CL	BC	350	B.S.	HY	
PW	4"-12"	PVC	--	--	C900	B.S.	HY	
FM	4"-12"	D.I.	ECCL	BC	350	B.S.	HY	
FM	4"-12"	HDPE	--	--	As Required	B.W.	HY	

SS	8"-12"	D.I.	EC	BC	350	B.S.	AIR	
SS	8"-12"	PVC	--	--	ASTM 3034	B.S.	AIR	

A. Polyvinyl chloride (PVC) pressure pipe, 4 - 12 inches in diameter, shall be Class 235, DR 18, meeting the requirements of AWWA C900 and shall have cast-iron-pipe-equivalent outside diameters (also known as ductile iron pipe size (DIPS)). Each length of pipe shall be hydrostatically tested to four times its pressure class of the pipe by the manufacturer in accordance with AWWA C900..

B. Polyethylene tubing 2 inches in diameter and smaller for potable water and reclaimed water shall be high-density PE 3408 polyethylene resin per ASTM D2737, Pressure Class 200, Copper Tube Size (CTS), SDR 9, Performance Pipe DriscoPlex 5100, Endot EndoPure, Charter Plastics or an approved equal, meeting the requirements of AWWA C901. Butt fusion or CTS brass connections shall be used. All pipe materials used in potable water systems shall comply with NSF Standard 61.

C. Ductile iron pipe shall conform to AWWA C150 and AWWA C151. Pipe shall be Pressure Class 350. All pipe materials used in potable water systems shall comply with NSF Standard 61.

D. Polyvinyl chloride (PVC) gravity sewer pipe and fittings, 4-15 inches in diameter, shall be SDR 26, meeting the requirements of ASTM D 3034. Joining of pipe sections and fittings shall be by water-tight push-on joints using elastomeric gaskets in accordance with ASTM D 3212.

The following abbreviations are used in the piping schedule:

A. Service Abbreviations

Potable Water	PW	Secondary Sludge	SS
Force Main	FM		

B. Material Abbreviations

Polyvinyl Chloride	PVC	Ductile Iron	DI
High Density Polyethylene	HDPE		

C. Lining/Coating Abbreviations

Cement Lined	CL
Bituminous Coated	BC
Epoxy Coated	EC

D. Joint Abbreviations

Belt and Spigot	BS	Flanged	Flg
Mechanical Joint	MJ	Butt Welded	BW

E. Test Abbreviations

Hydrostatic test (Pressure-psig)	HY (	) Exfiltration	EX
Low pressure air	AIR		
No test required	NR		

END OF SECTION 33 11 00

SECTION 33 12 16

VALVES, 4-INCH AND LARGER

PART 1 - GENERAL

1.1 DESCRIPTION

A. Scope:
   1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified and required to furnish and install 4- inch and larger valves and appurtenances, complete and operational.

B. Related Sections:
   1. Section 09900, Painting.
   2. Section 15051, Buried Piping Installation.
   3. Section 15052, Exposed Piping Installation.

1.2 REFERENCES

A. Comply with the applicable provisions and recommendations of the following standards, except as otherwise shown or specified.

B. ANSI Standards:
   1. B16.1, Cast-Iron Pipe Flanges and Flanged Fittings.
   2. B16.34, Valves-Flanged, Threaded, and Welding End.

C. API Standards:
   1. 594, Wafer Check Valves.
   2. 598, Valve Inspection and Test.
   3. 609, Butterfly Valves, Lug-Type and Wafer-Type.

D. ASTM Standards:
   1. A126, Gray Iron Castings for Valves, Flanges and Pipe Fittings.
   2. A193, Alloy Steel and Stainless Steel Bolting Materials for High Temperature Service.
   3. A194, Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service.
   4. A307, Carbon Steel Externally Threaded Standard Fasteners.
   5. A380, Practice for Cleaning and Descaling Stainless Steel Parts, Equipment and Systems.
   6. A536, Ductile Iron Castings.
   7. A743, Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application.
   8. B21, Naval Brass, Rod, Bar, and Shapes.
   9. B61, Steam or Valve Bronze Castings.
   10. B62, Composition Bronze or Ounce Metal Castings.

11. B98, Copper-Silicon Alloy Rod, Bar, and Shapes.
12. B124, Copper and Copper Alloy Forging Rod, Bar and Shapes.
13. B138, Manganese Bronze Rod, Bar and Shapes.
14. D429, Test Methods for Rubber Property - Adhesion to Rigid Substrates.
15. B584, Copper Alloy Sand Castings for General Applications.

E. AWWA Standards:
1. C502, Dry-Barrel Fire Hydrants.
2. C504, Rubber-Seated Butterfly Valves.
3. C507, Ball Valves, 6 Inch Through 48 Inch.
4. C508, Swing-Check Valves for Waterworks Service, 2 Inch Through 24 Inch.
5. C509, Resilient-Seated Gate Valves for Water Supply Service.
6. C550, Protective Epoxy Interior Coatings for Valves and Hydrants.

1.3 QUALITY ASSURANCE

A. Qualifications:
1. Manufacturer:
a. Minimum of five years of experience producing substantially similar equipment and able to show evidence of at least five installations in satisfactory operation for at least five years in the continental United States.
b. Equipment shall be manufactured in the United States.

B. Component Supply and Compatibility:
1. Obtain all equipment included in this Section, regardless of the component manufacturer, from the valve manufacturer to ensure compatibility and proper operation.

1.4 SUBMITTALS

A. Shop Drawings:
1. Product data sheets.
2. Complete catalog information, including dimensions, weight, specifications, and identification of materials of construction of all parts.
3. Cv values and headloss curves.
4. Certificates of compliance with AWWA Standards where applicable.
5. Corrosion resistance information to confirm suitability of the valve materials for the application. Information on chemical resistance of elastomers shall be furnished from the elastomer manufacturers.

B. Certified copies of shop test results and inspection data.

C. Operation and Maintenance Data: Submit complete manuals including:
1. Copies of all approved Shop Drawings, test reports, maintenance

data and schedules, description of operation, and spare parts information.

PART 2 - PRODUCTS

2.1 GENERAL PROVISIONS

A. Manually operated valves, with or without extension stems, shall require not more than a 40-pound pull on the manual operator to open or close a valve against the specified criteria. The gear actuator and the valve components shall be able to withstand a minimum pull of 200 pounds on the manual operator and an input torque of 300 foot pounds to an actuator nut. Manual operators include handwheel, and a T-handle wrench.

B. Provide all valves to turn clockwise to close, unless otherwise specified.

C. Provide all valves with permanent markings for direction to open.

D. Provide exposed valves with flanged ends conforming to ANSI B16.1. The pressure class of the flanges shall be equal to or greater than the specified pressure rating of the valves.

E. Provide buried valves with mechanical or push-on joints, restrained or unrestrained, as required by the piping with which they are installed.

F. All materials of construction of the valves shall be suitable for the application as shown on the Drawings.

G. Protect wetted parts from galvanic corrosion due to contact of two different metals.

H. Provide all valves with manufacturer's name and rated pressure cast in raised letters on the valve body.

I. Provide valves with brass or Type 316 stainless steel nameplates attached with Type 316 stainless steel screws. Nameplates shall have engraved letters and shall include the following information as a minimum:
   1. Valve size.
   2. Pressure and temperature ratings.
   3. Application (other than water and wastewater).
   4. Date of manufacture.
   5. Manufacturer's name.

J. Clean and descale fabricated stainless steel items in accordance with ASTM A380, and as follows:
   1. Passivate all stainless steel welded fabricated items after manufacture by immersion in a pickling solution of 6 percent nitric acid and 3 percent hydrofluoric acid. Temperature and detention time shall be sufficient for removal of oxidation and ferrous contamination without etching the surface. Perform a complete neutralizing operation by immersion in a trisodium phosphate rinse followed by a clean water wash.
   2. Scrub welds with the same pickling solution or pickling paste and clean with stainless steel wire brushes or by grinding with non- metallic abrasive tools to remove weld discoloration, and then neutralize and wash clean.

K. For stainless steel bolting, except where Nitronic-60 nuts are required, use anti-seize compound, graphite free, to prevent galling. Strength of the joint shall not be affected by the use of anti-seize compound.

2.2 APPURTENANCES FOR EXPOSED METALLIC VALVES

A. Handwheels:
   1. Conform to the applicable AWWA Standards.
   2. Material of Construction: Ductile iron or cast aluminum.
   3. Arrow indicating direction of opening and word "OPEN" shall be cast on the trim of the handwheel.
   4. Maximum Handwheel Diameter: 30 inches.

2.3 APPURTENANCES FOR BURIED METALLIC VALVES

A. Wrench Nuts:
   1. Provide wrench nuts on all buried valves of nominal 2-inch size conforming to AWWA C500.
   2. Arrow indicating direction of opening the valve shall be cast on the nut along with the word "OPEN".
   3. Material: Ductile iron.
   4. The nut shall be secured to the stem by mechanical means.

B. Extension Stems for Non-Rising Stem Gate Valves and Quarter Turn Buried Valves:
   1. Provide extension stems to bring the operating nut to 6 inches below the valve box cover.
   2. Minimum Size and Material: Same as valve stem.
   3. Maximum Unsupported Length: 3 feet.
   4. Provide top nut and bottom coupling of ductile iron with pins and set screws of Type 316 stainless steel.

C. Valve Boxes:
   1. Valve boxes shall be as indicated and as required.
   2. Type: Heavy duty, suitable for highway loading, 2-piece telescopic, and adjustable. Lower section shall enclose operating nut and stuffing box and rest on bonnet.
   3. Material: Cast or ductile iron.
   4. Coating: Two coats of asphalt varnish conforming to Federal Specification TT-C-494.
   5. Marking: As required for service.

2.4 ANCHOR AND MISCELLANEOUS MOUNTING BOLTS

A. All bolts, nuts and washers for connection of the valve appurtenances to concrete structure or other structural members shall be obtained from the valve manufacturer, and shall be of ample size and strength for the purpose intended. Anchor bolts shall be hooked or adhesive type.

B. Provide anchor bolts for stem guides of required strength to prevent twisting or sagging of the guides under load.

C. Provide bolts and washers of Type 316 stainless steel and nuts of Nitronic 60. The bolts shall have rolled threads and both bolts and nuts shall be electropolished to remove burrs.

D. Minimum Size of Anchor Bolts: 5/8 inch.

2.5 PAINTING OF EXPOSED VALVES, HYDRANTS AND APPURTENANCES

A. Exterior steel, cast-iron, and ductile iron surfaces except machined surfaces of all exposed valves and appurtenances shall be finish painted in the shop. The surface preparation, priming, finish painting, and field touch-up painting shall conform to Section 09900.

2.6 PAINTING OF BURIED VALVES

A. Exterior steel, cast-iron, and ductile iron surfaces except machined or bearing surfaces of all buried valves shall be shop-painted with two coats of asphalt varnish conforming to Federal Specification TT-C 494.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install all valves and appurtenances in accordance with the manufacturer's instructions.
B. Conform to appendices of AWWA Standards, where applicable.
C. Install all valves so that operating handwheels or levers can be conveniently turned from operating floor without interfering with access to other valves and equipment, and as approved by the ENGINEER. Orient chain operators out of the way of the walking areas. Mount valves so that indicator arrows are visible from floor level.
D. For motor-operated valves located lower than five feet above the operating floor, orient the motor actuator to permit easy access to the push buttons and the handwheel.
E. Install all valves plumb and level. Install all valves to be free from distortion and strain caused by misaligned piping, equipment or other causes.
F. For buried valve installations, set valve boxes plumb and centered, with soil carefully tamped to a lateral distance of 4 feet on all sides of the box, or to the undisturbed trench face if less than 4 feet. Provide a flexible coupling next to a buried valve for ease of valve removal.
G. Install plug valves in horizontal liquid lines with the stem horizontal and the plugs on top when the valves are open and the plugs on upstream end when the valves are closed. Install valves in vertical liquid lines with the plug at the top when closed.

3.2 FIELD TESTS AND ADJUSTMENTS

A. Adjust all parts and components as required to provide correct operation of the valves.

B. Conduct a functional field test on each valve in the presence of the ENGINEER to demonstrate that each valve operates correctly.

C. Verify satisfactory operation and controls of motor operated valves.

D. Demonstrate satisfactory opening and closing of valves at the specified criteria requiring not more than 40 pounds effort on the manual actuators.

E. Test 10 percent valves of each type by applying 200 pounds effort on the manual operators. There shall be no damage to the gear actuator or the valve.

END OF SECTION 33 12 16

(Section 33 41 00) Item D-701

Pipe for Storm Drains and Culverts

DESCRIPTION

701-1.1 This item shall consist of the construction of pipe culverts and storm drains in accordance with these specifications and in reasonably close conformity with the lines and grades shown on the plans.

MATERIALS

701-2.1 Materials shall meet the requirements shown on the plans and specified below. Underground piping and components used in drainage systems for terminal and aircraft fueling ramp drainage shall be noncombustible and inert to fuel in accordance with National Fire Protection Association (NFPA) 415.

701-2.2 Pipe. The pipe shall be of the type called for on the plans or in the proposal and shall be in accordance with the following appropriate requirements:

AASHTO M252 Standard Specification for Corrugated Polyethylene Drainage Pipe

AASHTO M294 Standard Specification for Corrugated Polyethylene Pipe, 12- to 60-in. Diameter

701-2.3 Joint mortar. Pipe joint mortar shall consist of one part Portland cement and two parts sand. The Portland cement shall conform to the requirements of ASTM C150, Type I. The sand shall conform to the requirements of ASTM C144.

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CONSTRUCTION METHODS

701-3.1 Excavation. The width of the pipe trench shall be sufficient to permit satisfactory jointing of the pipe and thorough tamping of the bedding material under and around the pipe, but it shall not be less than the external diameter of the pipe plus 12 inches on each side. The trench walls shall be approximately vertical.

The Contractor shall comply with all current federal, state and local rules and regulations governing the safety of men and materials during the excavation, installation and backfilling operations. Specifically, the Contractor shall observe that all requirements of the Occupational Safety and Health Administration (OSHA) relating to excavations, trenching and shoring are strictly adhered to. The width of the trench shall be sufficient to permit satisfactorily jointing of the pipe and thorough compaction of the bedding material under the pipe and backfill material around the pipe, but it shall not be greater than the widths shown on the plans trench detail.

Where rock, hardpan, or other unyielding material is encountered, the Contractor shall remove it from below the foundation grade for a depth of at least 8 inch or 1/2 inch for each foot of fill over the top of the pipe (whichever is greater) but for no more than three-quarters of the nominal

diameter of the pipe. The excavation below grade should be filled with granular material to form a uniform foundation.

Where a firm foundation is not encountered at the grade established, due to soft, spongy, or other unstable soil, the unstable soil shall be removed and replaced with approved granular material for the full trench width. The RPR shall determine the depth of removal necessary. The granular material shall be compacted to provide adequate support for the pipe.

The excavation for pipes placed in embankment fill shall not be made until the embankment has been completed to a height above the top of the pipe as shown on the plans.

701-3.2 Bedding. The bedding surface for the pipe shall provide a foundation of uniform density to support the pipe throughout its entire length.

a. Rigid pipe. The pipe bedding shall be constructed uniformly for the full length of the pipe barrel, as required on the plans. The maximum aggregate size shall be 1 in when the bedding thickness is less than 6 inches, and 1-1/2 in when the bedding thickness is greater than 6 inches. Bedding shall be loosely placed uncompacted material under the middle third of the pipe prior to placement of the pipe.

b. Flexible pipe. For flexible pipe, the bed shall be roughly shaped to fit the pipe, and a bedding blanket of sand or fine granular material shall be provided as follows:

Flexible Pipe Bedding

Pipe Corrugation Depth		**Minimum Bedding Depth**	
inch	**mm**	**inch**	**mm**
1/2	12	1	25
1	25	2	50
2	50	3	75
2-1/2	60	3-1/2	90

c. Other pipe materials. For PVC, polyethylene, polypropylene, or fiberglass pipe, the bedding material shall consist of coarse sands and gravels with a maximum particle size of 3/4 inches. For pipes installed under paved areas, no more than 12% of the material shall pass the No. 200 sieve. For all other areas, no more than 50% of the material shall pass the No. 200 sieve. The bedding shall have a thickness of at least 6 inches below the bottom of the pipe and extend up around the pipe for a depth of not less than 50% of the pipe's vertical outside diameter.

701-3.3 Laying pipe. The pipe laying shall begin at the lowest point of the trench and proceed upgrade. The lower segment of the pipe shall be in contact with the bedding throughout its full length. Bell or groove ends of rigid pipes and outside circumferential laps of flexible pipes shall be placed facing upgrade.

Paved or partially lined pipe shall be placed so that the longitudinal center line of the paved segment coincides with the flow line.

Elliptical and elliptically reinforced concrete pipes shall be placed with the manufacturer's reference lines designating the top of the pipe within five degrees of a vertical plane through the longitudinal axis of the pipe.

701-3.4 Joining pipe. Joints shall be made with (1) cement mortar, (2) cement grout, (3) rubber gaskets, (4) plastic gaskets, (5) coupling bands.

Mortar joints shall be made with an excess of mortar to form a continuous bead around the outside of the pipe and shall be finished smooth on the inside. Molds or runners shall be used for grouted joints to retain the poured grout. Rubber ring gaskets shall be installed to form a flexible watertight seal.

a. Concrete pipe. Concrete pipe may be either bell and spigot or tongue and groove. Pipe sections at joints shall be fully seated and the inner surfaces flush and even. Concrete pipe joints shall be sealed with rubber gaskets meeting ASTM C443 when leak resistant joints are required. Concrete pipe joints shall be sealed with butyl mastic meeting ASTM C990 or mortar when soil tight joints are required. Joints shall be thoroughly wetted before applying mortar or grout.

b. Metal pipe. Metal pipe shall be firmly joined by form-fitting bands conforming to the requirements of ASTM A760 for steel pipe and AASHTO M196 for aluminum pipe.

c. PVC, Polyethylene, or Polypropylene pipe. Joints for PVC, Polyethylene, or Polypropylene pipe shall conform to the requirements of ASTM D3212 when leak resistant joints are required. Joints for PVC and Polyethylene pipe shall conform to the requirements of AASHTO M304 when soil tight joints are required. Fittings for polyethylene pipe shall conform to the requirements of AASHTO M252 or ASTM M294. Fittings for polypropylene pipe shall conform to ASTM F2881, ASTM F2736, or ASTM F2764.

701-3.5 Embedment and Overfill. Pipes shall be inspected before any fill material is placed; any pipes found to be out of alignment, unduly settled, or damaged shall be removed and re-laid or replaced at the Contractor's expense.

701-3.5-1 Embedment Material Requirements

a. Concrete Pipe. Embedment material and compaction requirements shall be in accordance with the applicable Type of Standard Installation (Types 1, 2, 3, or 4) per ASTM C1479. If a concrete cradle or CLSM embedment material is used, it shall conform to the plan details.

b. Plastic and fiberglass Pipe. Embedment material shall meet the requirements of ASTM D3282, A-1, A-2-4, A-2-5, or A-3. Embedment material shall be free of organic material, stones larger than 1.5 inches in the greatest dimension, or frozen lumps. Embedment material shall extend to 12 inches above the top of the pipe.

c. Metal Pipe. Embedment material shall be granular as specified in the contract document and specifications, and shall be free of organic material, rock fragments larger than 1.5 inches in the greatest dimension and frozen lumps. As a minimum, backfill materials shall meet the requirements of ASTM D3282, A-1, A-2, or A-3. Embedment material shall extend to 12 inches above the top of the pipe.

701-3.5-2 Placement of Embedment Material

The embedment material shall be compacted in layers not exceeding 6 inches on each side of the pipe and shall be brought up one foot above the top of the pipe or to natural ground level, whichever is greater. Thoroughly compact the embedment material under the haunches of the

pipe without displacing the pipe. Material shall be brought up evenly on each side of the pipe for the full length of the pipe.

When the top of the pipe is above the top of the trench, the embedment material shall be compacted in layers not exceeding 6 inches and shall be brought up evenly on each side of the pipe to one foot above the top of the pipe. All embedment material shall be compacted to a density required under Item P-152.

Concrete cradles and flowable fills, such as controlled low strength material (CLSM) or controlled density fill (CDF), may be used for embedment provided adequate flotation resistance can be achieved by restraints, weighing, or placement technique.

It shall be the Contractor's responsibility to protect installed pipes and culverts from damage due to construction equipment operations. The Contractor shall be responsible for installation of any extra strutting or backfill required to protect pipes from the construction equipment.

701-3.6 Overfill

Pipes shall be inspected before any overfill is in place. Any pipes found to be out of alignment, unduly settled, or damaged shall be removed and relaid or replaced at the Contractor's expense. Evaluation of any damage to RCP shall be evaluated based on AASHTO R73.

Overfill material shall be place and compacted in layers as required to achieve compaction to at least 95 percent standard proctor per ASTM D698 . The soil shall contain no debris, organic matter, frozen material, or stones with a diameter greater than one half the thickness of the compacted layers being placed.

701-3.7 Inspection Requirements

An initial post installation inspection shall be performed by the RPR no sooner than 30 days after completion of installation and final backfill. Clean or flush all lines prior to inspection.

Incorporate specific inspection requirements for the various types of pipes beneath the general inspection requirements.

Flexible pipes shall be inspected for rips, tears, joint separations, soil migration, cracks, localized buckling, settlement, alignment, and deflection. Determine whether the allowable deflection has been exceeded by use of a laser profiler for internal pipe diameters of 48 inches or less, or direct measurement for internal pipe diameters greater than 48 inches. Laser profile equipment shall utilize low barrel distortion video equipment. Deflection of installed pipe shall not exceed the limits provided in the table below, as a percentage of the average inside diameter of the pipe.

Maximum Allowable Pipe Deflection

Type of Pipe	**Maximum Allowable Deflection (%)**
Corrugated Metal Pipe	5
Concrete Lined CMP	3
Thermoplastic Pipe	5
Fiberglass	5

If deflection readings in excess of the allowable deflection are obtained, remove the pipe with excessive deflection and replace with new pipe. Repair or replace any pipe with cracks exhibiting displacement across the crack, bulges, creases, tears, spalls, or delaminations. The report for flexible pipe shall include as a minimum, the deflection results and final post installation inspection report. The inspection report shall include: a copy of all video taken, pipe location identification, equipment used for inspection, inspector name, deviation from design line and grade, and inspector's notes.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M167	Standard Specification for Corrugated Steel Structural Plate, Zinc-Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches
AASHTO M190	Standard Specification for Bituminous-Coated Corrugated Metal Culvert Pipe and Pipe Arches
AASHTO M196	Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains
AASHTO M219	Standard Specification for Corrugated Aluminum Alloy Structural Plate for Field-Bolted Pipe, Pipe-Arches, and Arches
AASHTO M243	Standard Specification for Field Applied Coating of Corrugated Metal Structural Plate for Pipe, Pipe-Arches, and Arches
AASHTO M252	Standard Specification for Corrugated Polyethylene Drainage Pipe
AASHTO M294	Standard Specification for Corrugated Polyethylene Pipe, 300- to 1500-mm (12- to 60-in.) Diameter
AASHTO M304	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Wall Drain Pipe and Fittings Based on Controlled Inside Diameter
AASHTO MP20	Standard Specification for Steel Reinforced Polyethylene (PE) Ribbed Pipe, 300- to 900-mm (12- to 36-in.) Diameter

ASTM International (ASTM)

ASTM A760	Standard Specification for Corrugated Steel Pipe, Metallic Coated for Sewers and Drains
ASTM A761	Standard Specification for Corrugated Steel Structural Plate, Zinc Coated, for Field-Bolted Pipe, Pipe-Arches, and Arches
ASTM A762	Standard Specification for Corrugated Steel Pipe, Polymer Precoated for Sewers and Drains
ASTM A849	Standard Specification for Post-Applied Coatings, Pavings, and Linings for Corrugated Steel Sewer and Drainage Pipe
ASTM B745	Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains
ASTM C14	Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe
ASTM C76	Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe
ASTM C94	Standard Specification for Ready Mixed Concrete
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C443	Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C506	Standard Specification for Reinforced Concrete Arch Culvert, Storm Drain, and Sewer Pipe
ASTM C507	Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain and Sewer Pipe
ASTM C655	Standard Specification for Reinforced Concrete D-Load Culvert, Storm Drain and Sewer Pipe
ASTM C990	Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants
ASTM C1433	Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers
ASTM D1056	Standard Specification for Flexible Cellular Materials Sponge or Expanded Rubber
ASTM D3034	Standard Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D3212	Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM D3262	Standard Specification for "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Sewer Pipe

ASTM D3282	Standard Practice for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes
ASTM D4161	Standard Specification for "Fiberglass" (Glass-Fiber Reinforced Thermosetting Resin) Pipe Joints Using Flexible Elastomeric Seals
ASTM D6690	Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements
ASTM F477	Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
ASTM F667	Standard Specification for 3 through 24 in. Corrugated Polyethylene Pipe and Fittings
ASTM F714	Standard Specification for Polyethylene (PE) Plastic Pipe (DR PR) Based on Outside Diameter
ASTM F794	Standard Specification for Poly (Vinyl Chloride) (PVC) Profile Gravity Sewer Pipe & Fittings Based on Controlled Inside Diameter
ASTM F894	Standard Specification for Polyethylene (PE) Large Diameter Profile Wall Sewer and Drain Pipe
ASTM F949	Standard Specification for Poly (Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings
ASTM F2435	Standard Specification for Steel Reinforced Polyethylene (PE) Corrugated Pipe
ASTM F2562	Specification for Steel Reinforced Thermoplastic Ribbed Pipe and Fittings for Non-Pressure Drainage and Sewerage
ASTM F2736	Standard Specification for 6 to 30 in. (152 to 762 mm) Polypropylene (PP) Corrugated Single Wall Pipe and Double Wall Pipe
ASTM F2764	Standard Specification for 30 to 60 in. (750 to 1500 mm) Polypropylene (PP) Triple Wall Pipe and Fittings for Non-Pressure Sanitary Sewer Applications
ASTM F2881	Standard Specification for 12 to 60 in. (300 to 1500 mm) Polypropylene (PP) Dual Wall Pipe and Fittings for Non-Pressure Storm Sewer Applications

National Fire Protection Association (NFPA)

NFPA 415	Standard on Airport Terminal Buildings, Fueling Ramp Drainage, and Loading Walkways

END ITEM D-701

(Section 33 49 00) Item D-751 Drainage Structures

DESCRIPTION

751-1.1 This item shall consist of construction of manholes, catch basins, inlets, and inspection holes, in accordance with these specifications, at the specified locations and conforming to the lines, grades, and dimensions shown on the plans or required by the RPR.

MATERIALS

751-2.1 Brick. The brick shall conform to the requirements of ASTM C32, Grade MS.

751-2.2 Mortar. Mortar shall consist of one part Portland cement and two parts sand. The cement shall conform to the requirements of ASTM C150, Type I. The sand shall conform to the requirements of ASTM C144.

751-2.3 Concrete. Plain and reinforced concrete used in structures, connections of pipes with structures, and the support of structures or frames shall conform to the requirements of Item P-610.

751-2.4 Precast concrete pipe manhole rings. Precast concrete pipe manhole rings shall conform to the requirements of ASTM C478. Unless otherwise specified, the risers and offset cone sections shall have an inside diameter of not less than 36 inches nor more than 48 inches. There shall be a gasket between individual sections and sections cemented together with mortar on the inside of the manhole. Gaskets shall conform to the requirements of ASTM C443.

751-2.5 Corrugated metal. Corrugated metal shall conform to the requirements of American Association of State Highway and Transportation Officials (AASHTO) M36.

751-2.6 Frames, covers, and grates. The castings shall conform to one of the following requirements:

- **a.** ASTM A48, Class 35B: Gray iron castings
- **b.** ASTM A47: Malleable iron castings
- **c.** ASTM A27: Steel castings
- **d.** ASTM A283, Grade D: Structural steel for grates and frames
- **e.** ASTM A536, Grade 65-45-12: Ductile iron castings
- **f.** ASTM A897: Austempered ductile iron castings

All castings or structural steel units shall conform to the dimensions shown on the plans and shall be designed to support the loadings, aircraft gear configuration and/or direct loading, specified.

Each frame and cover or grate unit shall be provided with fastening members to prevent it from being dislodged by traffic but which will allow easy removal for access to the structure.

All castings shall be thoroughly cleaned. After fabrication, structural steel units shall be galvanized to meet the requirements of ASTM A123.

751-2.7 Steps. The steps or ladder bars shall be gray or malleable cast iron or galvanized steel. The steps shall be the size, length, and shape shown on the plans and those steps that are not galvanized shall be given a coat of asphalt paint, when directed.

751-2.8 Precast inlet structures. Manufactured in accordance with and conforming to ASTM C913.

CONSTRUCTION METHODS

751-3.1 Unclassified excavation.

a. The Contractor shall excavate for structures and footings to the lines and grades or elevations, shown on the plans, or as staked by the RPR. The excavation shall be of sufficient size to permit the placing of the full width and length of the structure or structure footings shown. The elevations of the bottoms of footings, as shown on the plans, shall be considered as approximately only; and the RPR may direct, in writing, changes in dimensions or elevations of footings necessary for a satisfactory foundation.

b. Boulders, logs, or any other objectionable material encountered in excavation shall be removed. All rock or other hard foundation material shall be cleaned of all loose material and cut to a firm surface either level, stepped, or serrated, as directed by the RPR. All seams or crevices shall be cleaned out and grouted. All loose and disintegrated rock and thin strata shall be removed. Where concrete will rest on a surface other than rock, the bottom of the excavation shall not be disturbed and excavation to final grade shall not be made until immediately before the concrete or reinforcing is placed.

c. The Contractor shall do all bracing, sheathing, or shoring necessary to implement and protect the excavation and the structure as required for safety or conformance to governing laws. The cost of bracing, sheathing, or shoring shall be included in the unit price bid for the structure.

d. All bracing, sheathing, or shoring involved in the construction of this item shall be removed by the Contractor after the completion of the structure. Removal shall not disturb or damage finished masonry. The cost of removal shall be included in the unit price bid for the structure.

e. After excavation is completed for each structure, the Contractor shall notify the RPR. No concrete or reinforcing steel shall be placed until the RPR has approved the depth of the excavation and the character of the foundation material.

751-3.2 Concrete structures. Concrete structures which are to be cast-in-place within the project boundaries shall be built on prepared foundations, conforming to the dimensions and shape indicated on the plans. The construction shall conform to the requirements specified in Item P-610. Any reinforcement required shall be placed as indicated on the plans and shall be approved by the RPR before the concrete is placed.

All invert channels shall be constructed and shaped accurately to be smooth, uniform, and cause minimum resistance to flowing water. The interior bottom shall be sloped to the outlet.

751-3.3 Precast concrete structures. Precast concrete structures shall be furnished by a plant meeting National Precast Concrete Association Plant Certification Program or another RPR approved third party certification program.

Precast concrete structures shall conform to ASTM C478. Precast concrete structures shall be constructed on prepared or previously placed slab foundations conforming to the dimensions and locations shown on the plans. All precast concrete sections necessary to build a completed

structure shall be furnished. The different sections shall fit together readily. Joints between precast concrete risers and tops shall be full-bedded in cement mortar and shall: (1) be smoothed to a uniform surface on both interior and exterior of the structure or (2) utilize a rubber gasket per ASTM C443. The top of the upper precast concrete section shall be suitably formed and dimensioned to receive the metal frame and cover or grate, or other cap, as required. Provision shall be made for any connections for lateral pipe, including drops and leads that may be installed in the structure. The flow lines shall be smooth, uniform, and cause minimum resistance to flow. The metal or metal encapsulated steps that are embedded or built into the side walls shall be aligned and placed in accordance to ASTM C478. When a metal ladder replaces the steps, it shall be securely fastened into position.

751-3.4 Inlet and outlet pipes. Inlet and outlet pipes shall extend through the walls of the structures a sufficient distance beyond the outside surface to allow for connections. They shall be cut off flush with the wall on the inside surface of the structure, unless otherwise directed. For concrete or brick structures, mortar shall be placed around these pipes to form a tight, neat connection.

751-3.5 Placement and treatment of castings, frames, and fittings. All castings, frames, and fittings shall be placed in the positions indicated on the plans or as directed by the RPR, and shall be set true to line and elevation. If frames or fittings are to be set in concrete or cement mortar, all anchors or bolts shall be in place before the concrete or mortar is placed. The unit shall not be disturbed until the mortar or concrete has set.

When frames or fittings are placed on previously constructed masonry, the bearing surface of the masonry shall be brought true to line and grade and shall present an even bearing surface so the entire face or back of the unit will come in contact with the masonry. The unit shall be set in mortar beds and anchored to the masonry as indicated on the plans or as directed by the RPR. All units shall set firm and secure.

After the frames or fittings have been set in final position, the concrete or mortar shall be allowed to harden for seven (7) days before the grates or covers are placed and fastened down.

751-3.5 Installation of steps. The steps shall be installed as indicated on the plans or as directed by the RPR. When the steps are to be set in concrete, they shall be placed and secured in position before the concrete is placed. When the steps are installed in brick masonry, they shall be placed as the masonry is being built. The steps shall not be disturbed or used until the concrete or mortar has hardened for at least seven (7) days. After seven (7) days, the steps shall be cleaned and painted, unless they have been galvanized.

When steps are required with precast concrete structures they shall meet the requirements of ASTM C478. The steps shall be cast into the side of the sections at the time the sections are manufactured or set in place after the structure is erected by drilling holes in the concrete and cementing the steps in place.

When steps are required with corrugated metal structures, they shall be welded into aligned position at a vertical spacing of 12 inches.

Instead of steps, prefabricated ladders may be installed. For brick or concrete structures, the ladder shall be held in place by grouting the supports in drilled holes. For metal structures, the ladder shall be secured by welding the top support to the structure and grouting the bottom support into drilled holes in the foundation or as directed by the RPR.

751-3.6 Backfilling.

a. After a structure has been completed, the area around it shall be backfilled with approved material, in horizontal layers not to exceed 8 inches in loose depth, and compacted to the density required in Item P-152. Each layer shall be deposited evenly around the structure to approximately the same elevation. The top of the fill shall meet the elevation shown on the plans or as directed by the RPR.

b. Backfill shall not be placed against any structure until approved by the RPR. For concrete structures, approval shall not be given until the concrete has been in place seven (7) days, or until tests establish that the concrete has attained sufficient strength to withstand any pressure created by the backfill and placing methods.

c. Backfill shall not be measured for direct payment. Performance of this work shall be considered an obligation of the Contractor covered under the contract unit price for the structure involved.

751-3.7 Cleaning and restoration of site. After the backfill is completed, the Contractor shall dispose of all surplus material, dirt, and rubbish from the site. Surplus dirt may be deposited in embankments, shoulders, or as approved by the RPR. The Contractor shall restore all disturbed areas to their original condition. The Contractor shall remove all tools and equipment, leaving the entire site free, clear, and in good condition.

REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM International (ASTM)

ASTM A27	Standard Specification for Steel Castings, Carbon, for General Application
ASTM A47	Standard Specification for Ferritic Malleable Iron Castings
ASTM A48	Standard Specification for Gray Iron Castings
ASTM A123	Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A283	Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A536	Standard Specification for Ductile Iron Castings
ASTM A897	Standard Specification for Austempered Ductile Iron Castings
ASTM C32	Standard Specification for Sewer and Manhole Brick (Made from Clay or Shale)
ASTM C144	Standard Specification for Aggregate for Masonry Mortar
ASTM C150	Standard Specification for Portland Cement
ASTM C443	Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets.
ASTM C478	Standard Specification for Precast Reinforced Concrete Manhole Sections

ASTM C913	Standard Specification for Precast Concrete Water and Wastewater Structures.

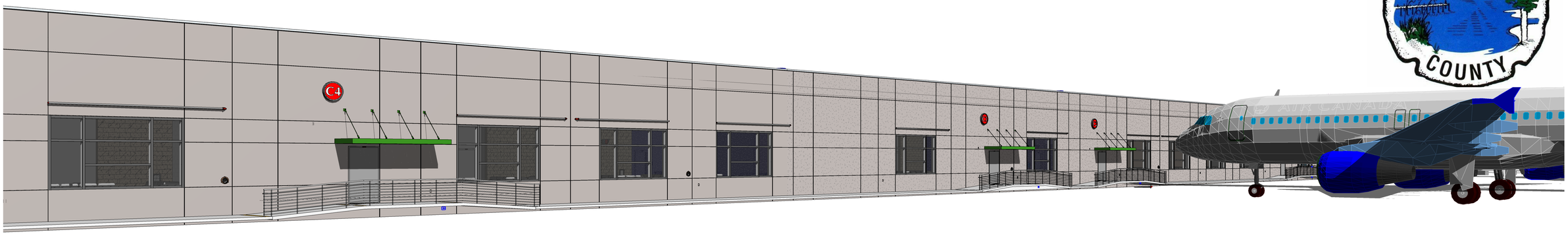
American Association of State Highway and Transportation Officials (AASHTO)

AASHTO M36	Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains

END OF ITEM D-751

C19-2811- AP Construction of Satellite Concourse 'C'

OKALOOSA COUNTY
1701 State Road 85N, Eglin AFB, FL 32542-1498



PROJECT NUMBER: MLM-19672

ISSUE DATE: 30-NOV-2020

BUILDING PERMIT #:

BID DOCUMENTS

PROJECT DESIGN TEAM:

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Carolyn Ketchel - (Vice Chairman) Commissioner District 2
Graham Fountain - Commissioner District 1
Nathan Boyles - Commissioner District 3
Kelly Windes - Commissioner District 5

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Tracy Stage, A.A.E. - Airports Director
Mike Stenson, MBA - Airports Deputy Director
Allyson Oury, CPA - Airports Deputy Director – CFO
Chad Rogers, P.E. - Airports Deputy Director - Plans & Programs

MLM-MARTIN
ARCHITECTS, INC.

Professional Seals

MIGUEL ANTONIO
MARTIN
FL AR-98279

ARCHITECTURAL

G000

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G111 MASTER KENOTE INDEX
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G311 SPACE UTILIZATION PLANS

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AL641 INTERIOR PARTITION TYPES
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AL851 WALL ASSEMBLY LISTING
AL852 WALL ASSEMBLY LISTING
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AL862 JOINT ASSEMBLY LISTING
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C301 FENCING DETAILS
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T902 IDF W1277 RACK ELEVATION
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TS712 SCHEDULES - DOOR ACCESS CONTROL
TS811 DETAILS - SECURITY DOORS
TS812 DETAILS - SECURITY CCTV

NOTICE:
SCHEDULE(S) REVISED
WHEN THIS AREA IS CLOUDED

C19-2811- AP
Construction
of Satellite
Concourse 'C'

668 N. ORLANDO AVE.
SUITE 107
MAITLAND, FL 32751

407.897.6764 (VOICE)
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WWW.MLM-MARTIN.COM

AA-C002208
ALM 30B-F-TYPE PROPERTY

MLM-MARTIN ARCHITECTS, INC.

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	NO SCALE

Drawing Title:

DRAWING INDEX

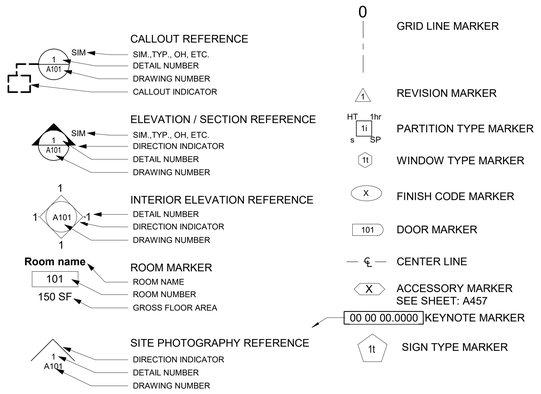
BID DOCUMENTS

Drawing No.:

G001

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt
12/9/2020 11:54:52 AM

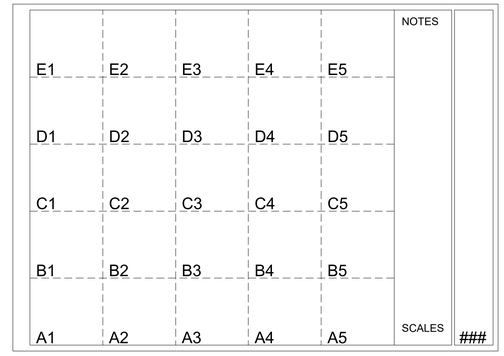
SYMBOLS



DETAIL NUMBERING LEGEND

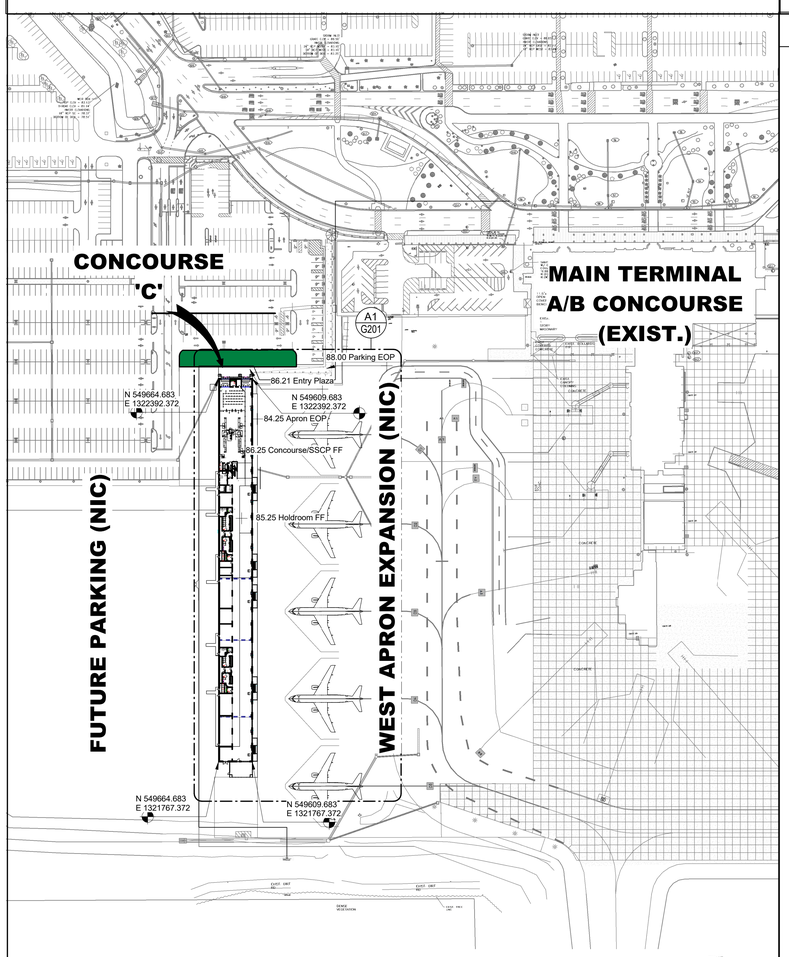
EACH SHEET IS DIVIDED INTO AN ALPHA-NUMERIC GRID COORDINATE SYSTEM WHICH IS USED TO ORGANIZE THE DRAWING DETAILS

DRAWING TITLES ARE NUMBERED ACCORDING TO ITS LOCATION ON THE GRID, THE LOWER LEFT HAND CORNER IS USED TO IDENTIFY THE GRID SPACE AND CORRESPONDING DETAIL (SEE DIAGRAM)



MATERIALS LEGEND

- COMPACT FILL (EARTH)
- CAST-IN-PLACE CONCRETE
- GROUT
- STEEL
- ALUMINUM
- ORNAMENTAL METAL (INDICATE TYPE)
- GLASS
- PLASTIC
- GWB
- LATH AND STUCCO
- MASONRY (CMU)
- MASONRY (BRICK)
- PRE-CAST CONCRETE
- WOOD (BLOCKING)
- ROUGH WOOD FRAMING
- PLYWOOD (ROUGH)
- INSULATION (LOOSE OR BATT)
- RIGID INSULATION



A2 PROJECT LOCATION PLAN

1" = 100'-0"

ABBREVIATIONS

A/C	AIR CONDITION,-ED,-ER,-ING	L.L.H.	LONG LEG HORIZONTAL
ADJ.	ADJUSTABLE	L.L.V.	LONG LEG VERTICAL
A.F.F.	ABOVE FINISH FLOOR	MAT; MAT'L	MATERIAL
ALUM.	ALUMINUM	MAX.	MAXIMUM
&	AND	MECH.	MECHANICAL
L	ANGLE	MFRS.	MANUFACTURER
APPROX.	APPROXIMATELY	MIN.	MINIMUM
@	AT	MISC.	MISCELLANEOUS
BLDG.	BUILDING	M.O.	MASONRY OPENING
B.O.	BOTTOM OF	MTD.	MOUNTED
CEIL./CLG.	CEILING	MTL.	METAL
C.J.	CONTROL JOINT	N.	NATURAL; NORTH
℄	CENTER LINE	NO., #	NUMBER
CLO./CL.	CLOSET	NOM.	NOMINAL
CLR.	CLEAR	N.I.C.	NOT IN CONTRACT
COL.	COLUMN	O.C.	ON CENTER
CONC.	CONCRETE	OD	OUTSIDE DIAMETER
CONST.	CONSTRUCTION	OPNG.	OPENING
CONT.	CONTINUOUS	PL.	PLATE
C.M.U	CONCRETE MASONRY UNIT	PLY.	PLYWOOD
D.F.	DRINKING FOUNTAIN	P.P.	POWER POLE
DIA. / Ø	DIAMETER	PT./PTD.	PAINT / PAINTED
DIM.	DIMENSION	P.T.	PRESSURE TREATED
DISP.	DISPENSER / DISPOSAL	P.T.D.	PAPER TOWEL DISPENSER
DN.	DOWN	P.T.H.	PAPER TOWEL HOLDER
DR.	DOOR	P.V.C.	POLYVINYL CHLORIDE
DTL./DET.	DETAIL	PNL.	PANEL
DWG.	DRAWING	R., RAD.	RADIUS OF GYRATION
E.	EAST	R.C.P.	REINFORCED CONCRETE PIPE
EA.	EACH	R.D.	ROOF DRAIN
E.J.	EXPANSION JOINT	RECT.	RECTANGULAR
ELEC.	ELECTRICIAN, ELECTRICAL	REINF.	REINFORCEMENT
ELEV.	ELEVATOR	REQ'D.	REQUIRED
ENCL.	ENCLOSURE	RM.	ROOM
EQ.	EQUAL	R.O.	ROUGH OPENING
EQUIP.	EQUIPMENT	R.O.W.	RIGHT-OF-WAY
E.W.C.	ELECTRIC WATER COOLER	S.	SUCTION; SINGLE ENTRANCE; SOUTH
EXIST.	EXISTING	SCH.; SCHED.	SCHEDULE
EXT.	EXTERIOR	S.D.	SOAP DISPENSER
F.D.	FLOOR DRAIN	S.H.	SOAP HOLDER
F.E.	FIRE EXTINGUISHER	SHT.	SHEET
F.F.	FINISH FLOOR	S.M.S.	STRUCTURAL METAL STUD
F.H.	FIRE HYDRANT	SPC.	SPACE
F.H.C.	FIRE HOSE CABINET	SPECS.	SPECIFICATIONS
FIN.	FINISH	SQ.	SQUARE
FLR.	FLOOR	S.S.	STAINLESS STEEL / SERVICE SINK
F.R.	FIRE RESISTANT	STD.	STANDARD
FT.	FEET / FOOT	ST.; STL.	STEEL
FTG.	FOOTING	STRUCT.	STRUCTURAL
GA.	GAUGE	T.	TOILET
GALV.	GALVANIZED	T.B.	TIE BEAM
G.B.	GRAB BAR	T & G.	TONGUE AND GROOVE; TAR AND GRAVEL
G.C.	GENERAL CONTRACTOR	T.O.	TOP OF
G.W.B.	GYPSUM WALL BOARD	T.P.H.	TOILET PAPER HOLDER
GYP.	GYPSUM	TYP.	TYPICAL
HCPD.	HANDICAPPED	U.O.N.	UNLESS OTHERWISE NOTED
H.M.	HOLLOW METAL	UR.	URINAL
HORIZ.	HORIZONTAL	V.C.P.	VITREOUS CLAY PIPE
HT.	HEIGHT	VERT.	VERTICAL
INV.	INVERT	W	WIRE; WATT; WIDE; WEST
JAN.	JANITOR	W/	WITH
JT.	JOINT	W.C.	WATER COLUMN; WATER CLOSET
LAM.	LAMINATED	WD.	WOOD
LAV.	LAVATORY	W.H.	WATER HEATER

SCALE: 1" = 100'-0"

0 25' 50' 100' 200'

C19-2811- AP
Construction of Satellite Concourse 'C'

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SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	1" = 100'-0"

Drawing Title:
ABBREVIATIONS, GENERAL NOTES & LEGENDS
BID DOCUMENTS

Drawing No.:
G101

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MASTER KEYNOTE LIST

NO.	
01 21 00.E217	TYP. ALLOWANCE FOR FIXED MULTIPLE SEATING WORK.
01 23 00.0000	LIMITS OF ALTERNATE WORK, SEE SPECIFICATIONS FOR MORE INFORMATION.
01 23 04.B123	TYP. ALTERNATE 4 CANOPY CONTRUCTION WORK.
01 23 05.G237	TYP. ALTERNATE 5 EXTERIOR CONCESSIONS PLAZA WORK.
03 05 31.0031	TYP. CAST SLEEVE FOR PENETRENTS.
03 05 31.0070	TYP. BUTYL TAPE AROUND SLEEVE.
03 05 31.0080	TYP. SAW CUT CONTROL JOINT.
03 21 00.0000	TYP. CONCRETE REINFORCING STEEL BAR(S), SEE STRUCTURAL.
03 21 00.500C	TYP. NO. 5 CONCRETE REINFORCEMENT BARS @ 12" OC, SEE STRUCTURAL.
03 21 00.600O	TYP. NO. 6 CONCRETE REINFORCEMENT BARS @ 24" OC, SEE STRUCTURAL.
03 21 00.5310	TYP. (3) NO. 5 CONCRETE REINFORCEMENT BARS CONT., SEE STRUCTURAL.
03 31 00.A000	TYP. CONCRETE SLABS-ON-GRADE, SEE STRUCTURAL
03 31 00.B000	TYP. STRUCTURAL CONCRETE FLOOR SLAB, SEE STRUCTURAL.
03 31 00.B104	TYP. 4" STRUCTURAL SLAB-ON-GRADE, SEE STRUCTURAL.
03 31 00.B105	TYP. 5" CONCRETE FLOOR SLAB, SEE STRUCTURAL
03 31 00.C104	TYP. 4" STRUCTURAL CAST-IN-PLACE CONCRETE WALL, SEE STRUCTURAL
03 31 00.D000	TYP. CONCRETE CAST-IN-PLACE BEAM, SEE STRUCTURAL
03 31 00.D130	TYP. 12" X 16" CAST-IN-PLACE BEAM, SEE STRUCTURAL
03 31 00.F100	TYP. CONTINOUS WALL FOUNDATION, SEE STRUCTURAL.
03 45 13.DZ60	TYP. 8" X 24" FACED ARCHITECTURAL PRECAST CONCRETE, SAND FINISH.
03 60 00.A200	TYPICAL FILL SOLID W/ GROUT
04 01 20.1926	TYP. MASONRY REINFORCING INSPECTION OPENING @ EACH FILLED CELL, SEE STRUCTURAL
04 05 16.363K	TYP. FILL CELL MASONRY W/ 3000 PSI GROUT.
04 05 19.2600	TYP. MASONRY REINFORCING BARS, SEE STRUCTURAL
04 05 19.HC16	TYP. MASONRY HORIZONTAL GALVANIZED WIRE REINFORCING @ 16" O.C. MAX
04 05 22.0023	TYP. MASONRY WALL TIES @ 16" OC, VERT. & HORZ.
04 05 22.0048	TYP. CMU SASH EXPANSION MATERIAL, SEE SPECIFICATIONS.
04 05 23.1953	TYP. 1/4" 'V' GROVE CUT CONT. AROUND CAP STONE.
04 22 00.000C	TYP. 12" NOMINAL CONCRETE MASONRY UNIT
04 22 00.00KC	TYP. 12" NOMINAL GROUT FILLED CONCRETE MASONRY KNOCK-OUT UNIT.
04 22 00.00L8	TYP. 8" NOM. LINTEL CONCRETE MASONRY UNIT.
04 22 00.00LC	TYP. 12" NOM. LINTEL CONCRETE MASONRY UNIT.
04 22 00.0008	TYP. 8" NOMINAL CONCRETE MASONRY UNIT.
04 22 23.530C	TYP. BURNISHED CORNER CONCRETE MASONRY UNIT
04 22 23.530D	TYP. BURNISHED 2 FACE CONCRETE MASONRY UNIT
04 22 23.5304	TYP. 4" BURNISHED CONCRETE MASONRY UNIT
04 22 23.5308	TYP. 8" BURNISHED CONCRETE MASONRY UNIT
04 22 23.5312	TYP. 12" BURNISHED CONCRETE MASONRY UNIT
04 72 00.0004	TYP. CAST STONE CAP TO MATCH EXISTING, 4" TALL.

MASTER KEYNOTE LIST

NO.	
05 05 21.1923	TYP. JOIST BEARING ANGLE, REF. STRUC.
05 05 23.2000	TYP. STAINLESS STEEL FASTENER(S).
05 05 31.2323	TYP. ROOF DECK CLOSURE, REF. STRUC.
05 05 51.3300	TYP. STEEL ANGLE SUPPORT WELD CONT. @ STRINGER AND FLOOR ANCHOR
05 05 51.3301	2-1/2" X 3/8" VERTICAL MTL. STRINGER
05 05 51.3302	TYP. 1" DIA MTL. RUNGS @ 12" O.C. CONT. WELD TO EACH STRINGER
05 05 51.3303	TYP. 12"MIN. X 2" WIDE BENT STEEL 3/8" PLATE SUPPORT CONT. WELD TO STRINGER SO THAT MIN. CLEARANCE FROM CENTERLINE OF RUNG AND NEAREST OBSTRUCTION IS 7" U.O.N.
05 12 00.H000	TYP. HSS SHAPE STRUCTURAL STEEL FRAMING, SEE STRUCTURAL.
05 12 00.H668	TYP. HSS 6X6X1/2 STRUCTURAL STEEL FRAMING, SEE STRUCTURAL.
05 12 00.L000	TYP. STEEL ANGLE 'L' SHAPE MEMBER, SEE STRUCTURAL.
05 12 00.W000	TYP. STEEL WIDE FLANGE 'W' SHAPE MEMBER, SEE STRUCTURAL.
05 21 19.00K0	TYP. K SERIES OPEN WEB STEEL JOIST, SEE STRUCTURAL.
05 21 19.00L0	TYP. LH SERIES LONG SPAN JOIST, SEE STRUCTURAL.
05 31 23.W639	TYP. 1-1/2" WR 20 GA. G90 STEEL ROOF DECK, SEE STRUCTURAL.
05 31 53.V049	TYP. 4" DOVETAIL G-90 GALV. STEEL ARCHITECTURALLY EXPOSED DECK. BASIS OF DESIGN: EPIC TORIS 4 - CANOPY.
05 41 13.I000	10" "C" JOIST
05 51 33.A000	STEEL ROOF ACCESS LADDER
05 52 13.2000	TYP. STAINLESS STEEL PIPE AND TUBE RAILING.
05 52 13.2012	TYP. STAINLESS STEEL PIPE AND TUBE RAILING, INFILL HORIZONTAL 1-1/4" NOM. HSS 1.660 X 0.140 PIPE.
05 52 13.2013	TYP. STAINLESS STEEL PIPE AND TUBE RAILING, HAND RAIL.
05 52 13.2017	TYP. STAINLESS STEEL PIPE AND TUBE RAILING, GUARD RAIL.
05 52 13.2031	TYP. STAINLESS STEEL PIPE AND TUBE RAILING, POST 1-1/2" NOM. HSS 1.900 X 0.188 PIPE @ 3'-0" OC MAX..
05 52 13.2053	TYP. STAINLESS STEEL PIPE AND TUBE RAILING, HANDRAIL RAIL SUPPORTS AS REQ'D.
05 52 13.2056	TYP. STAINLESS STEEL PIPE AND TUBE RAILING, EMBED POST MIN. OF 5".
06 11 14.F000	TYP. NOMINAL FIRE RETARDINT WOOD BLOCKING, CONT.
06 11 14.F260	TYP. 2X6 NOMINAL FIRE RETARDINT WOOD BLOCKING, CONT.
06 11 14.F280	TYP. 2X8 NOMINAL FIRE RETARDINT WOOD BLOCKING, CONT.
06 11 24.F200	TYP. FIRE RETARDINT WOOD BLOCKING NAILER, CONT. CUT FROM (2) 2X NOMINAL.
06 16 33.F800	TYP. 1/2" FR PLYWOOD.
06 16 33.FC00	TYP. 3/4" FR PLYWOOD.
06 41 16.0000	PLASTIC LAMINATE CLAD CASEWORK.
06 41 16.1450	TYP. PLASTIC LAMINATE CLAD ACCESS PANEL CASEWORK.
06 41 93.1100	TYP. FULL LENGTH PIANO HINGE.
06 41 93.1320	TYP. HEAVY DUTY FULL EXTENSION STAINLESS STEEL SLIDE CASEWORK HARDWARE.
06 41 93.2120	TYP. STAINLESS STEEL CASEWORK LOCK HADRWARE.
06 43 00.A100	TYP. 2X_ NOMINAL FR TREATED WOOD STRINGER CUT.
06 43 00.B100	TYP. 2X_ NOMINAL FR TREATED WOOD TREADS AND RISERS.
06 60 16.1600	TYP. SOLID SURFACING COUNTERTOPS.

MASTER KEYNOTE LIST

NO.	
07 05 22.1623	TYP. ROOF BOARD INSULATION FASTENERS, SEE MNFR. INSTRUCTIONS.
07 05 26.1623	TYP. BELOW GRADE VAPOR BARRIER TERMINATION BAR, FASTEN PER MNFR. INSTRUCTION.
07 05 26.1627	TYP. MASTIC SEALER FOR BELOW GRADE VAPOR BARRIER. USE MNFR. APPROVED MASTIC AND INSTALL AS INSTRUCTED.
07 05 26.1651	TYP. ADHESIVE JOINT TAPE FOR BELOW GRADE VAPOR BARRIER. USE MNFR. APPROVED TAPE AND INSTALL AS INSTRUCTED.
07 05 27.2951	TYP. LAP 40 MILL THICK FLUID-APPLIED MEMBRANE VAPOR RETARDING AIR BARRIER JOINT ADHESIVE TAPE OVER STUCCO ACCESSORY AND BARRIER.
07 05 54.1921	TYP. PVC ROOFING MEMBRANE ADHESIVE COAT.
07 05 54.1922	TYP. PVC ROOFING MEMBRANE CAP/FLASHING PLY WELD.
07 05 54.1925	TYP. PVC ROOF MEMBRANE SYSTEM TERMINATION HARDWARE, FASTEN AND SEAL PER NOA/FLORIDA PRODUCT APPROVAL OR 8" OC MIN. WHICHEVER IS MORE RESTRICTIVE.
07 05 54.1927	TYP. PVC ROOF MEMBRANE SYSTEM FASTENERS AND STRESS PLATE HARDWARE @ 12" OC AROUND SUMP.
07 05 54.1928	TYP. PVC ROOF MEMBRANE SYSTEM FASTENERS AND STRESS PLATE HARDWARE MIN. (4).
07 05 54.1929	TYP. PVC ROOF MEMBRANE SYSTEM SEALANT.
07 05 54.1951	TYP. PVC ROOF MEMBRANE SYSTEM PREFORMED BUTYL TAPE SEALANT.
07 05 71.1321	TYP. MANUFACTURED COPING CLEAT, INSTALL PER MNFR. INSTRUCTIONS.
07 05 71.1323	TYP. 1/2" DIA. SS EXPANSION BOLTS W/4" EMBEDMENT MIN. @ 16" CENTERS STAGGERED. PROVIDED (2) SIDE BY SIDE BOLTS ON EACH END OF BLOCKING SPLICES. HEADS SHALL BE COUNTERSUNK.
07 21 13.13I6	TYP. 3" THICK, POLYISOCYANURATE RIGID FOAM BOARD INSULATION.
07 21 16.G006	TYP. 3" ACOUSTICAL BATT INSULATION.
07 21 23.0422	TYP. FILL ALL UN-GROUTED CELLS WITH INJECTED FOAM FILL INSULATION.
07 22 16.16I8	TYP. 4" MIN. POLYISOCYANURATE RIGID FOAM ROOF BOARD INSULATION.
07 22 16.23PA	TYP. 5/8" PRIMED DENS DECK ROOF INSULATION COVER BOARD.
07 22 16.230A	TYP. 5/8" DENS DECK ROOF INSULATION COVER BOARD.
07 22 16.530S	TYP. 1/2" PER FOOT TAPPERED SUMP AT ROOF DRAIN, SEE DETAIL.
07 22 16.5301	TYP. PROVIDE TAPERED RIGID INSULATION BYOND MIN. THICKNESS REQUIREMENT TO ENSURE POSITIVE DRAINAGE TO ROOF DRAINS.
07 26 16.0315	TYP. 15 MIL BELOW GRADE VAPOR BARRIER.
07 27 26.0040	TYP. 40 MILL THICK FLUID-APPLIED MEMBRANE VAPOR RETARDING AIR BARRIER.
07 27 26.7000	FLUID APPLIED MEMBRANE VAPOR RETARDING AIR PARRIER COMPATABLE SEALANT.
07 27 26.9040	TYP. 40 MILL THICK FLUID-APPLIED MEMBRANE VAPOR RETARDING AIR BARRIER JOINT REINFORCEMENT SELF ADHEARING SHEET.
07 54 19.00C0	TYP. ROOF CRICKET.
07 54 19.0060	TYP. PVC MEMBRAINE ROOFING PRE-FORMED/MOLDED FLASHING.
07 54 19.0096	TYP. 60 MIL PVC MEMBRAINE ROOFING FLASHING SHEET.
07 54 19.1106	TYP. COLD ADHESIVE APPLIED, 60 MIL PVC MEMBRAINE ROOFING.
07 62 00.C000	TYP. STAINLESS STEEL COUNTER-FLASHING.
07 62 00.H000	TYP. 8" X 6" BEVELED ALUMINUM GUTTER.
07 71 13.5000	TYP. ALUMNINUM MANUFACTURED COPING SYSTEM, INSTALLED PER MNFR. INSTRUCTIONS.

MASTER KEYNOTE LIST

NO.	
07 72 33.0000	TYP. SINGLE-LEAF ROOF ACCESS HATCH W/ CURB AND SAFETY RAIL.
07 84 13.0017	TYP. PROTECT AND SEAL FIRE WALL FROM ALL EXISTING AND NEW PENETRATIONS W/ APPROPRIATE UL LISTED FIRESTOPPING ASSEMBLIES TO MAINTAIN ROOM RATING AND FIRE PROTECTION PRESSURIZATION REQUIREMENTS.
07 91 23.1010	TYP. BACKER ROD WITH JOINT SEALANT, CONT.
07 91 23.1014	TYP. 1/4" BACKER ROD WITH JOINT SEALANT, CONT.
07 91 23.1018	TYP. 1/2" BACKER ROD WITH JOINT SEALANT, CONT.
07 91 26.F018	TYP. 1/2" MINIERAL FIBER JOINT FILLER CONT.
07 92 00.00A0	TYP. JOINT SEALANT, FULL PERIMETER.
07 92 00.0010	TYP. JOINT SEALANT, CONT.
07 92 00.0014	TYP. 1/4" JOINT SEALANT, CONT.
07 92 00.0018	TYP. 1/2" JOINT SEALANT, CONT.
07 92 00.A000	TYPICAL BED OF SEALANT
08 05 00.0083	TYP. PT/FR SHIM AS REQUIRED.
08 05 12.0390	TYP. FILL FRAME SOLID WITH GROUT.
08 05 12.5150	TYP. (5) MASONRY TIE ANCHORS PER JAMB.
08 05 80.0027	TYP. GLAZING BUTYL TAPE, PER MNFR.
08 05 80.0048	TYP. GLAZING RUBBERIZED GASKETING, PER MNFR.
08 31 13.1500	TYPICAL GALV. MTL. CEILING ACCESS DOOR, PAINT TO MATCH SURROUNDING SURFACE.
08 42 29.130E	TYP. ALUMINUM FRAMED AUTOMATIC ENTRANCE PANIC EGRESS HARDWARE.
08 42 29.1300	TYP. ALUMINUM FRAMED AUTOMATIC ENTRANCE DOOR.
08 42 29.1301	TYP. ALUMINUM FRAMED AUTOMATIC ENTRANCE JAMB.
08 42 29.1303	TYP. ALUMINUM FRAMED AUTOMATIC ENTRANCE HEADER.
08 42 29.1305	TYP. ALUMINUM FRAMED AUTOMATIC ENTRANCE SILL.
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
08 44 13.0001	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY - JAMB EXTRUSION.
08 44 13.0003	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY - HEADER EXTRUSION.
08 44 13.0005	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY - SILL EXTRUSION WITH MNFR. FLASHING CLIP.
08 44 13.0007	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY - VERT. MULLION EXTRUSION WITH INTERNAL STEEL SUPPORT UN-INTURRUPTED SILL TO HEADER.
08 44 13.0009	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY - HORIZONTAL MULLION EXTRUSION WITH CLIPS @VERT.
08 71 00.1713	SADDLE THRESHOLD, SEE SPECIFICATION.
08 71 00.1799	TYP. DOOR DRIP HARDWARE AS SCHEDULED.
08 81 19.0003	TYP. 3/8" CLEAR TEMPERED GLAZING; SEE GLAZING TYPES FOR APPLIED FILM.
08 81 19.0004	TYP. 1/4" CLEAR TEMPERED GLAZING.
08 83 13.0004	TYP. 1/4" TEMPERED MIRROR GLAZING, WALL MOUNTED.
08 83 13.W100	TYP. FULL HEIGHT WALL MOUNTED MIRROR
08 88 19.1015	TYP. 1-5/16" HURRICANE-RESISTANT INSULATED GLAZING UNIT.
09 05 24.2329	TYP. PAPER BACKED SELF FURRING GALV. LATH.
09 05 29.00A5	TYP. ALUMINUM GYPSUM BOARD REVEAL BASE ACCESSORY.

MASTER KEYNOTE LIST

NO.	
09 05 29.00A7	TYP. ALUMINUM GYPSUM BOARD 3 PIECE COMPRESSION EXPANSION REVEAL ACCESSORY.
09 05 29.00AF	TYP. ALUMINUM GYPSUM BOARD 'F' REVEAL ACCESSORY.
09 05 29.0007	TYP. GWB ASSEMBLY CONTROL JOINT ACCESSORY.
09 05 30.150T	TYP. ALUM. TRIM EXTRUSION FOR PROCELIAN STONE TILE TRANSITION.
09 05 30.150X	TYP. ALUM. EXPANSION TRIM EXTRUSION FOR PROCELIAN STONE TILE.
09 05 30.1513	TYP. PROCELIAN STONE TILE THIN-SET MATERIAL, SEE SPECIFICATIONS.
09 05 65.1961	TYP. PREP SLAB TO RECIVE RESILIENT FLOOR TILE AND TRIM.
09 06 60.0000	TYP. FINISH FLOOR SEE ROOM FINISH SCHEDULE.
09 22 16.B000	TYPICAL 2 1/2" GALV. METAL STUD FRAMING @ 24" OC UNO.
09 22 16.D000	TYPICAL 3 5/8" GALV. METAL STUD FRAMING @ 24" OC UNO.
09 22 16.E000	TYP. 4" GALV. METAL STUD FRAMING @ 24" OC UNO.
09 22 16.G000	TYPICAL 6" GALV. METAL STUD FRAMING @16" OC UNO.
09 22 16.G040	TYP. 16 GA. 6" GALV. METAL STUD BLOCKING.
09 22 16.T000	TYPICAL GALV. METAL TRACK RUNNER CONT.
09 22 26.0000	TYP. GYPSUM ASSEMBLY SUSPENSION SYSTEM, INSTALL PER MNFR. INSTRUCTIONS.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
09 24 99.000J	TYP. CEMENT PLASTERING 'J' TRIM ACESSORY.
09 24 99.000L	TYP. CEMENT PLASTERING 'L' TRIM ACESSORY.
09 24 99.000M	TYP. CEMENT PLASTERING 'M' REVEAL SCREED ACESSORY.
09 24 99.000W	TYP. CEMENT PLASTERING WEEP SCREED ACESSORY.
09 24 99.000X	TYP. CEMENT PLASTERING EXPANSIN CHANNEL W/ 1/2" REVEAL SCREED ACESSORY.
09 29 00.X00A	TYPICAL 5/8" TYPE 'X' GYPSUM WALL BOARD
09 29 99.560C	TYP. GALV. GWB ASSEMBLY CORNER BEAD TRIM ACCESSORY.
09 29 99.560J	TYP. GALV. GWB ASSEMBLY 'J' CASING BEAD TRIM ACCESSORY.
09 30 15.3324	TYP. 12" X 24" RECTIFIED, PROCELIAN STONE WALL TILING.
09 30 15.5324	TYP. 12" X 24" RECTIFIED, PROCELIAN STONE FLOOR TILING.
09 51 23.0000	TYP. ACOUSITCAL TILE CEILING SYSTEM, REF. FINISH SCHEDULES.
09 51 23.0667	TYP. STANDARD, 24" X 24" TEGULAR ACOUSITCAL TILE CEILING SYSTEM.
09 53 53.A904	TYPICAL 9 GAUGE GALV. METAL HANGER WIRE @ 48" O.C. EACH WAY
09 53 53.H000	TYPICAL SUPPORT CLIP FOR MECHANICAL DIFFUSERS/GRILLS.
09 65 13.330T	TYP. VINYL - RESILIENT TRANSITION ACCESSORY.
09 65 13.1300	TYP. 4" VINYL COVE BASE; SEE SCHEDULE/
09 65 19.0000	TYP. LUXARY VINYL COMPOSITION TILE, SEE SCHEDULE.
09 65 19.T000	TYP. VINYL COMPOSITION TILE; SEE SCHEDULE.
09 65 99.550T	TYP. ALUM. TRIM EXTRUSION FOR RESILIENT TILE TRANSITION.
09 65 99.550X	TYP. ALUM. EXPANSION TRIM EXTRUSION FOR RESILIENT TILE TRANSITION.
09 96 56.2115	TYP. TEXTURED EPOXY FLOOR HIGH PERFORMANCE COATING.
10 05 73.1621	TYP. CANOPY SUPPORT TENSION ROD.

MASTER KEYNOTE LIST

NO.	
10 05 73.1623	TYP. THREADED ROD THROUGH BOLT W/ COMPRESSIVE SLEAVE & BACKPLATE FOR LOWER CONNECTION OF CANOPY.
10 05 73.1625	TYP. THREADED ROD THROUGH BOLT W/ COMPRESSIVE SLEAVE & BACKPLATE FOR UPPER CONNECTION OF CANOPY SYSTEM EYE BOLT. ATTACHMENT POINT MUST REMAIN IN VERTICLE POSITION.
10 14 16.A200	TYPICAL TACTILE SYMBOL - REFER TO SCHEDULE FOR SYMBOL
10 21 13.1900	TYP. PLASTIC TOILET COMPARTMENT.
10 22 00.0000	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY.
10 22 00.000C	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - 45 DEGREE CORNER EXTRUSION.
10 22 00.000L	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - 90 DEGREE CORNER EXTRUSION.
10 22 00.0001	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - END CAP EXTRUSION.
10 22 00.0002	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - "T" 3 WAY CONNECTION EXTRUSION.
10 22 00.0003	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - HEADER EXTRUSION.
10 22 00.0004	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - HEAD - RECESSED CEILING CHANNEL
10 22 00.0005	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - SILL EXTRUSION.
10 22 00.0006	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - SILL - ADJUSTABLE RECESS BASE.
10 22 00.0007	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - VERT. IN-LINE MULLION EXTRUSION UN-INTERRUPTED SILL TO HEADER.
10 22 00.0008	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - HEAD - RECESSED CEILING GASKET.
10 22 00.0009	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - HORIZONTAL IN-LINE MULLION EXTRUSION.
10 26 13.5250	TYP. 2" BRUSHED ALUMINUM WALL CORNER GUARD.
10 28 13.C000	TYPICAL GRAB BAR
10 43 13.0007	TYP. WALL CABINENT MOUNTED AUTOMATIC ELECTRONIC DEFIBRILLATOR (AED).
10 44 16.1005	TYP. RECESSED WALL CABINENT MOUNTED MULTI-PURPOSE (ABC CLASS) FIRE EXTINGUISHER.
10 73 16.5000	TYP. PREMANUFACTURED ALUMINUM CANOPY SYSTEM. PROVIDE SIGNED & SEALED CALCULATIONS/SHOPDRAWINGS COMPLYING W/ STRUCTURAL DESIGN LOADS.
11 14 03.0093	RETRACTABLE BELT STANCHION, NIC.
12 48 16.220A	TYP. 5/8" SS 304 WALKOFF ENTRY MAT.
21 06 20.0000	TYPICAL FIRE SUPPRESSION PIPING
22 07 19.1300	TYP. WRAP SINK P-TRAP AND EXPOSED SANITARY DRAIN LINES WITH PIPE INSULATION.
22 14 16.0006	TYP. 6" STORM WATER LEADER, SEE PLUMBING, SUPPORT AS REQUIRED TO 12" CMU ONLY.
22 14 26.1300	TYP. FACILITY STORM ROOF DRAIN W/ INTRIGAL OVERFLOW, SEE PLUMBING.
22 14 26.1900	TYP. FACILITY STORM TRENCH DRAIN, SEE PLUMBING.
22 14 26.2300	TYP. FACILITY STORM OVERFLOW OUTFALL FIXTURE, SEE PLUMBING. PROVIDE CONT. SEALANT AT WALL FLANGE.
22 42 13.1330	TYP. FLUSH VALVE WALL MOUNTED WATER CLOSET, SEE PLUMBING.
22 42 13.1630	TYP. FLUSH VALVE URINAL, SEE PLUMBING.
22 42 16.133A	TYP. ADA, WALL MOUNTED LAVATORY, SEE PLUMBING.

MASTER KEYNOTE LIST

NO.	
22 42 39.0001	TYP. RECESSED EXTERIOR WALL HYDRANT, SEE PLUBMING.
22 47 00.0030	DRINKING FOUNTAIN SEE PLUMBING
23 05 13.C000	TYPICAL PRE-ENGINEERED MECHANICAL CURB FOR HVAC & FAN EQUIPMENT, SEE MECHANICAL
23 07 16.8113	TYP. RIGID INSULATION INSERTS FOR PRE-MANUFACTURED ROOF TOP MECHAINICAL EQUIPMENT CURB.
23 08 81.1357	TYP. SERVICE CLEARANCES OF PACKAGED ROOFTOP UNIT MAINTAIN UNOBSTRUCTED ACCESS, SEE MECH.
23 22 13.0050	TYP. CONDENSATE PIPING, SEE MECH.
23 31 00.0000	TYPICAL HVAC DUCTWORK, SEE MECHANICAL
23 34 16.3070	TYP. ROOF TOP CENTRIFUGAL HVAC/EXHAUST FAN ON CURB, SEE MECHANICAL.
23 37 13.110L	LINEAR DIFFUSER, SEE MECHANICAL
23 37 13.1122	TYP. 1' X 1' HVAC SUPPLY DIFFUSER, SEE MECH.
23 37 13.1322	TYP. 1' X 1' HVAC EXHAUST REGISTER, SEE MECH.
23 37 13.1344	TYP. 2'X2' HVAC EXHAUST REGISTER, SEE MECH.
23 81 13.R000	TYP. PACKAGED ROOFTOP UNIT, SEE MECH.
26 05 33.1600	TYP. ELECTRICAL BOX WITH FACEPLATE, COORDINATE FACEPLATE WITH DIV. 26, 27 AND 28.
26 05 36.0000	TYP. CONCEALED S.S. WIRE TRAY SUSPEND FROM COUNTER.
26 12 00.0000	TYP. AREA RESERVED FOR UTILITY TRANSFORMER, REF CIVIL AND ELEC.
26 41 13.1300	TYP. LIGHTNING PROTECTION TERMINAL, SEE ELECTRICAL.
26 41 13.8300	TYP. LIGHTNING PROTECTION CONDUCTOR, SEE ELECTRICAL.
26 51 00.1900	TYP. RECESSED CEILING MOUNTED LED "CAN", SEE ELECTRICAL FOR FIXTURE TYPE. PROVIDE MUD FLANGE FOR GWB INSTALL.
26 51 00.1907	TYP. RECESSED CEILING MOUNTED LINIEAR LED, SEE ELECTRICAL FOR FIXTURE TYPE. PROVIDE FLANGE FOR ACT INSTALL.
28 13 53.0093	SECURITY ACCESS, METAL DETECTORS, X-RAY, EXPLOSIVE DETECTION, BAGGAGE AND PASSANGER SCREENING EQUIPMENT, NIC CONTRCTOR TO COORDINATE POWER AND DATA REQUIREMENTS.
28 23 29.0013	TYP. VSS CAMERA, SEE SECURITY DRAWINGS
31 23 23.2385	TYP. COMPACTED FILL TO A MIN. OF 85% COMPACTION AS PER ASTM D1557.
31 31 16.1300	TYP. SPRAY TERMITE TOXICANT BARRIER.
32 16 23.0405	TYP. 4" BROOM FINISHED CONCRETE SIDEWALK.
32 16 23.0505	TYP. 5" BROOM FINISHED CONCRETE SIDEWALK.
32 92 23.0000	TYP. SODDING AND PLANTING SEE LANDSCAPE.
34 01 73.0092	TYP. PRESERVE EDGE OF AIRFIELD CONSTRUCTION. COORDINATE PROTECTION OF BUILT ELEMENTS WITH ADJACENT PROJECT.

NOTICE:
SCHEDULE(S) REVISED
WHEN THIS AREA IS CLOUDED

OKALOOSA COUNTY

FLY VPS

C19-2811- AP Construction of Satellite Concourse 'C'

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MLM JOB #: TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	NO SCALE

Drawing Title:

MASTER KENOTE INDEX

BID DOCUMENTS

Drawing No.:

G111

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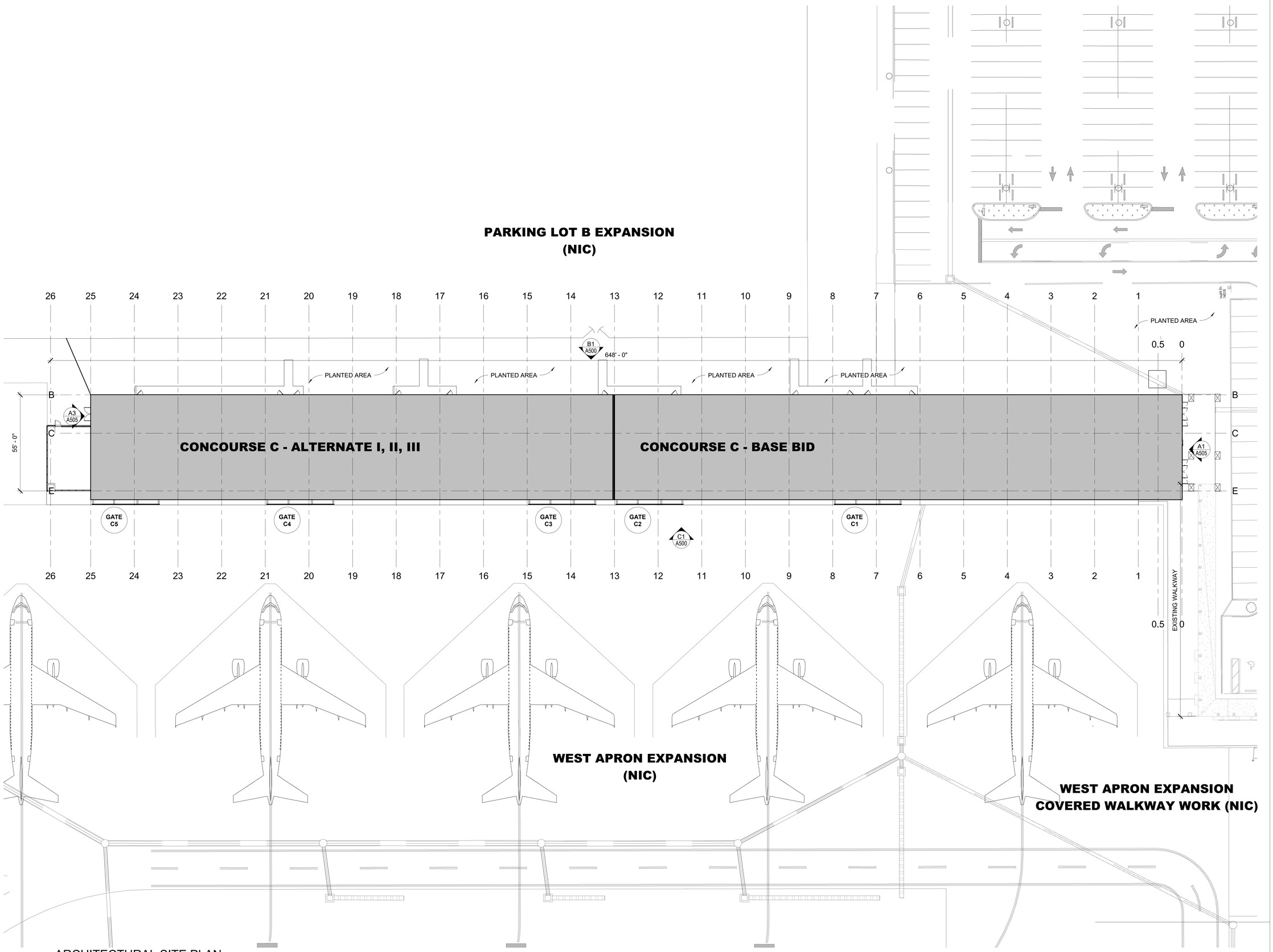

A1 ARCHITECTURAL SITE PLAN

1" = 20'-0"

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Drawing Title:

ARCHITECTURAL SITE PLAN

BID DOCUMENTS

Drawing No.:

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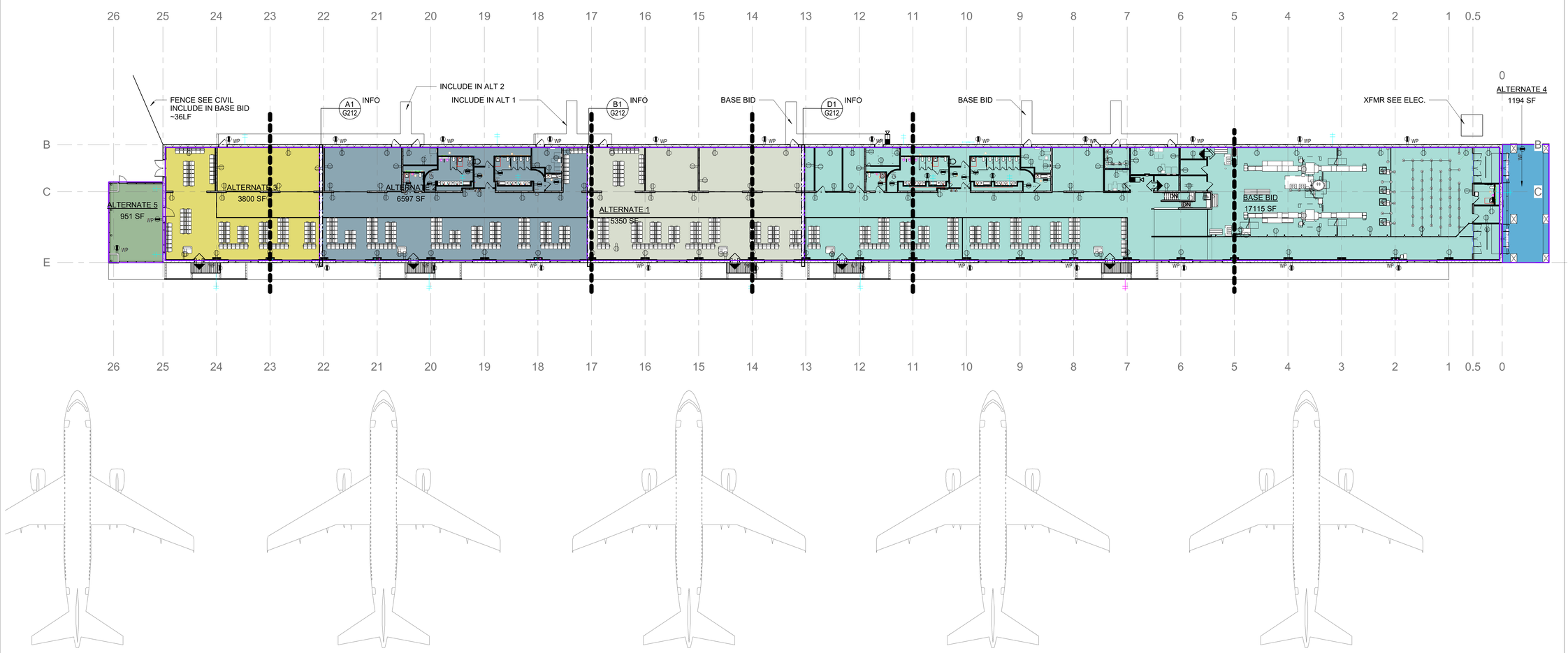

B1 ALTERNATE IDENTIFICATION PLAN CONCOURSE LEVEL

1" = 20'-0"

NORTH

ALTERNATE LEGEND

- ALTERNATE 1
  Concessions, Holdrooms C3 :
  REF LINES 13-17
- ALTERNATE 2
  Concessions, Restroom Core 2,
  Holdroom C4: REF LINES 17-22
- ALTERNATE 3
  Holdroom C5: REF LINES 22-25
- ALTERNATE 4
  Covered Entry Canopy and Structure
  Only; Slab in Base Bid
- ALTERNATE 5
  Outdoor Seating Area (Concessions)
- BASE BID
  Entry, TSA Support, SSCP,
  Restroom Core 1, Holdroom C1 & C2:
  REF LINES 00-13

ALTERNATE 6
SUBSTITUTE "CALLA" HIGH CAC 50
24" X 24" X 1-3/4" CEILING TILE FOR **ACT1**
SEE **AF712**

ALTERNATE 7
SUBSTITUTE CT2 FOR GT1 AND GT2
SEE **A45X SERIES & AF712**

SCALE: 1" = 20'-0"
0 5' 10' 20' 40'

OKALOOSA COUNTY

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Drawing Title:

IDENTIFICATION OF ALTERNANTES

BID DOCUMENTS

Drawing No.:

G211

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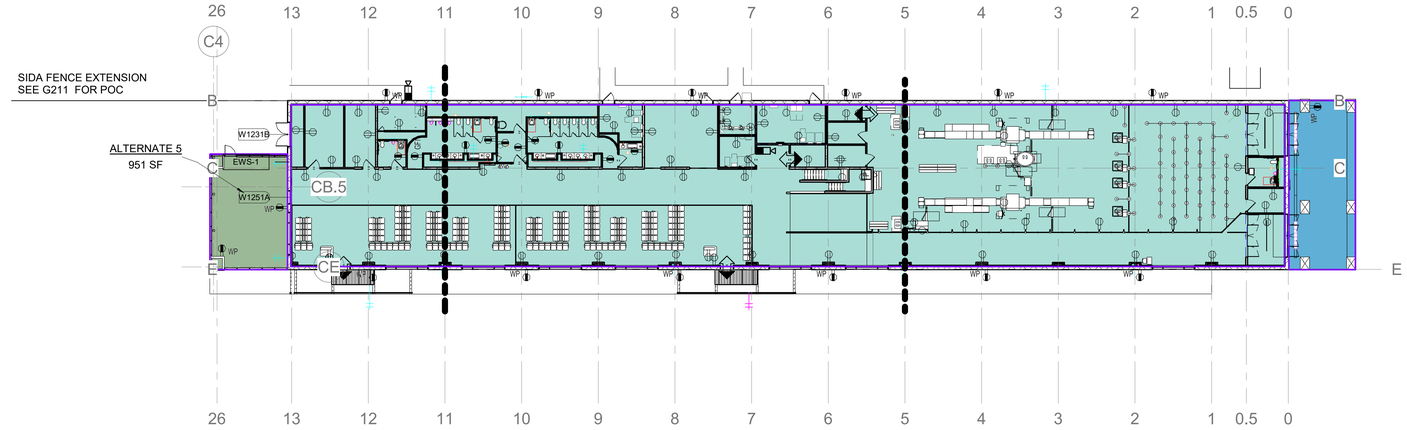
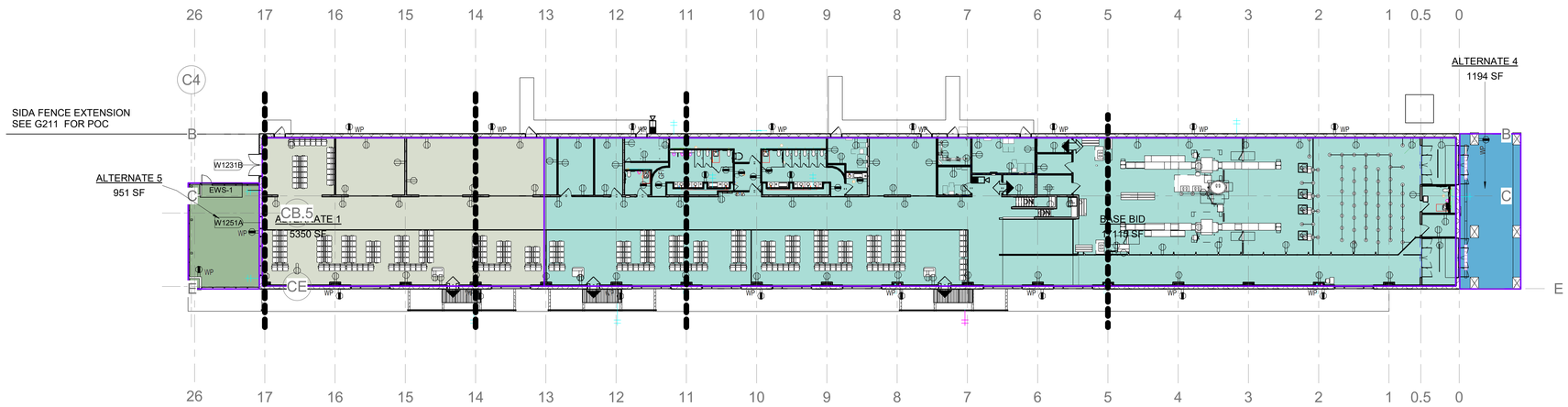


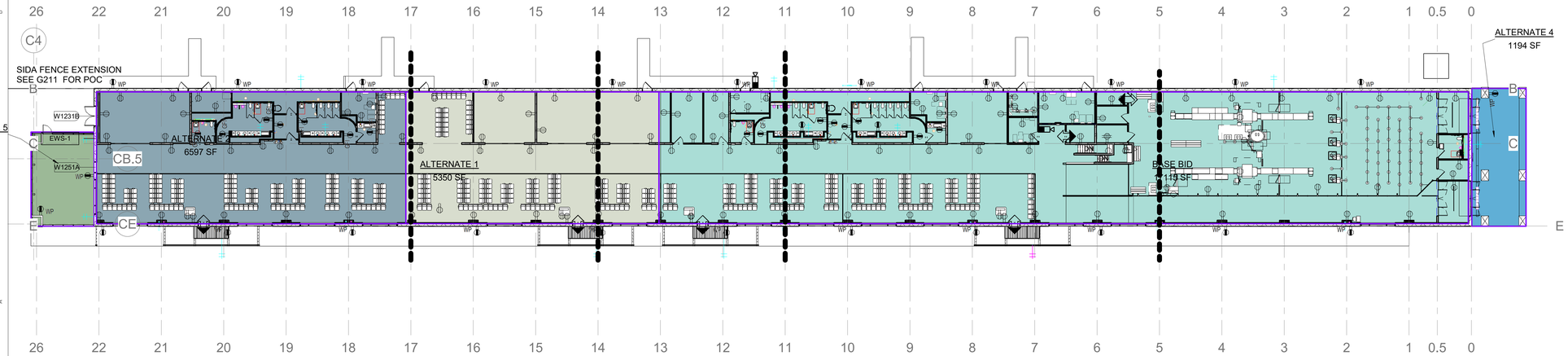
D1 ALTERNATE ILLUSTRATION BASE BID + ALTERNATES 4&5

1" = 20'-0"



B1 ALTERNATE ILLUSTRATION BASE BID + ALTERNATES 1,4&5

1" = 20'-0"



A1 ALTERNATE ILLUSTRATION BASE BID + ALTERNATES 1,2,4&5

1" = 20'-0"

SHEET PROVIDED FOR INFORMATION ONLY

SCALE: 1" = 20'-0"

0 5' 10' 20' 40'

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Drawing Title:

ILLUSTRATED ALTERNATE EXECUTION

BID DOCUMENTS

Drawing No.:

G212

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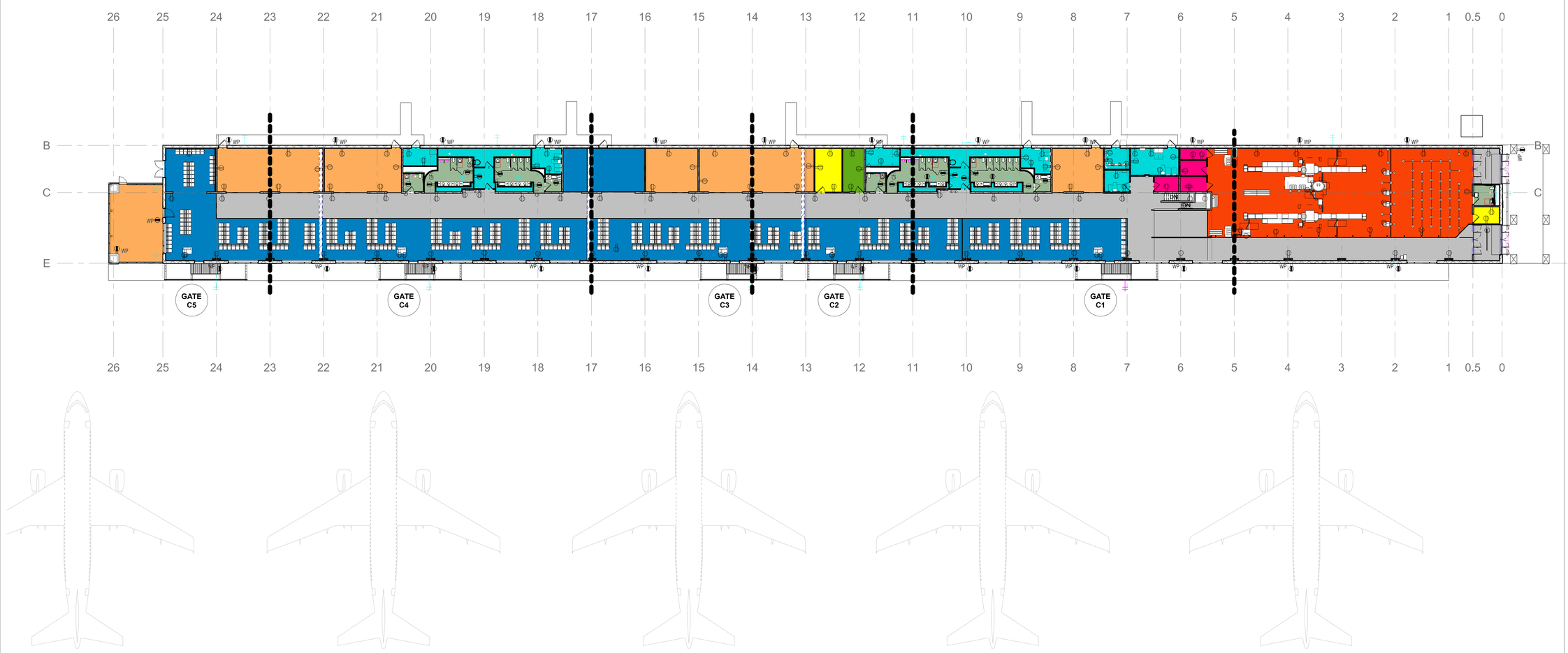

D1 SPACE UTILIZATION PLAN CONCOURSE LEVEL

1" = 20'-0"

NORTH

SPACE LEGEND

- ADMINISTRATION-AIRPORT
- CIRCULATION
- COMMERCIAL AIRLINE OPERATION - GATES
- COMMERCIAL AIRLINE OPERATION - OFFICES
- CONCESSIONAIRES
- RESTROOM
- SECURITY - TSA OFFICES
- SECURITY-PASSENGER SCREENING
- SUPPORT

SHEET PROVIDED FOR INFORMATION ONLY

SCALE: 1" = 20'-0"

0 5' 10' 20' 40'

OKALOOSA COUNTY

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Drawing Title:

SPACE UTILIZATION PLANS

BID DOCUMENTS

Drawing No.:

G311

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PROTECTION OF OPENINGS

PROTECTION OF OPENINGS IN FIRE BARRIER HORIZONTAL ASSEMBLIES

OPENINGS THROUGH A FLOOR/CEILING ASSEMBLIES SHALL BE PROTECTED IN ACCORDANCE WITH FBC SECTION 707 AND FFPC SECTION 8.6.

FIRE RESISTANCE RATINGS AND OPENING PROTECTION REQUIREMENTS
(FBC 707.6 AND TABLE 716.5)

EXIT SHAFTS:	2 HR WITH 90 MIN OPENINGS
ALL OTHER SHAFTS:	2 HR WITH 90 MIN OPENINGS
FIRE BARRIERS/PARTITIONS:	1 HR WITH 45 MIN OPENINGS
EXTERIOR BEARING WALLS:	1 HR WITH 45 MIN OPENINGS

DUCT PENETRATIONS (FBC 716.6)

PENETRATIONS BY DUCTS AND AIR TRANSFER OPENINGS OF A FLOOR, FLOOR/CEILING ASSEMBLY OR THE CEILING MEMBRANE OF A ROOF/CEILING ASSEMBLY SHALL BE PROTECTED BY A SHAFT ENCLOSURE THAT COMPLIES WITH FBC SECTION 707 OR SHALL COMPLY WITH FBC SECTION 716.6.

A DUCT AND AIR TRANSFER OPENING SYSTEM CONSTRUCTED OF APPROVED MATERIALS IN ACCORDANCE WITH THE FBC: MECHANICAL THAT PENETRATES A FIRE-RESISTANCE-RATED FLOOR/CEILING ASSEMBLY THAT CONNECTS NOT MORE THAN TWO STORIES IS PERMITTED WITHOUT SHAFT ENCLOSURE PROTECTION PROVIDED A FIRE DAMPER IS INSTALLED AT THE FLOOR LINE.

PROTECTION OF PENETRATIONS (FBC 714)

PENETRATIONS OF A FLOOR, FLOOR/CEILING ASSEMBLY, OR THE CEILING MEMBRANE OF A ROOF/CEILING ASSEMBLY SHALL BE PROTECTED BY A SHAFT ENCLOSURE IN ACCORDANCE WITH FBC SECTIONS 707 AND 713.4.
PENETRATIONS INTO OR THROUGH FIRE WALLS, FIRE BARRIERS, SMOKE BARRIER WALLS, AND FIRE PARTITIONS SHALL COMPLY WITH FBC SECTIONS 708 & 709 SUCH PENETRATIONS SHALL BE INSTALLED AS TESTED IN AN APPROVED FIRE-RESISTANCE RATED ASSEMBLY AND SHALL BE PROTECTED BY AN APPROVED PENETRATION FIRE-STOP SYSTEM.

WHERE POTENTIAL FUEL SPILL POINTS ARE LOCATED LESS THAN 100 FT HORIZONTALLY FROM GLAZING MATERIAL COVERED OPENINGS IN THE TERMINAL BUILDING WALLS FACING THE AIRPORT RAMP, THEY SHALL BE PROTECTED. (4.1.5.3, NFPA 415, 2008)

HANDRAILS AND GUARDRAILS

HANDRAILS AND GUARDRAILS SHALL BE PROVIDED ON BOTH SIDES OF ALL STAIRS AND RAMPS, IN ACCORDANCE WITH THE FOLLOWING:

A. STAIRS SHALL BE CLEAR OF ALL OBSTRUCTIONS EXCEPT PROJECTIONS NOT EXCEEDING 2 ½ INCHES AT OR BELOW HANDRAIL HEIGHT ON EACH SIDE.
B. NEW HANDRAILS SHALL BE INSTALLED TO PROVIDE A CLEARANCE OF NOT LESS THAN 2 ¼ INCHES BETWEEN THE HANDRAIL AND THE WALL TO WHICH IT IS FASTENED. (FFPC SIXTH ED 7.2.2.4.4.5)
C. HANDRAILS SHALL BE PROVIDED WITHIN 30 INCHES OF ALL PORTIONS OF THE STAIR WIDTH REQUIRED FOR EGRESS CAPACITY. (FFPC SIXTH ED 7.2.2.4.1.2)
D. HANDRAIL HEIGHT SHALL BE ≥ 34 IN. TO ≤ 38 IN. ABOVE THE SURFACE OF THE TREAD, MEASURED VERTICALLY FROM THE TOP OF THE RAIL FROM THE LEADING EDGE OF THE TREAD. (FFPC SIXTH ED 7.2.2.4.4.1)
E. HANDRAIL SHAPE, CIRCULAR CROSS SECTION WITH OUTSIDE DIAMETER ≥ 1-1/4 IN. TO ≤ 2 IN. OR, NON-CIRCULAR CROSS SECTION WITH PERIMETER ≥ 4 IN. TO ≤ 6-1/4 IN. AND LARGEST CROSS SECTION ≤ 2-1/4 IN. WITH ROUNDED EDGE (RADIUS ≥ 1/8 IN.). (FFPC SIXTH ED 7.2.2.4.4.6)
F. HANDRAILS AND GUARDS SHALL CONTINUE FOR THE FULL LENGTH OF EACH FLIGHT OF STAIRS. AT TURNS OF NEW STAIRS, INSIDE HANDRAILS SHALL BE CONTINUOUS BETWEEN FLIGHTS AT LANDINGS. (FFPC SIXTH ED 7.2.2.4.2)
G. HANDRAILS THAT ARE NOT CONTINUOUS BETWEEN FLIGHTS SHALL EXTEND HORIZONTALLY, AT THE REQUIRED HEIGHT, NOT LESS THAN 12 IN. BEYOND THE TOP RISER AND CONTINUE TO SLOPE FOR A DEPTH OF ONE TREAD BEYOND THE BOTTOM RISER. (FFPC SIXTH ED 7.2.2.4.4.10)
H. HANDRAIL ENDS SHALL BE RETURNED TO THE WALL OR FLOOR OR SHALL TERMINATE AT NEWEL POSTS. (FFPC SIXTH ED 7.2.2.4.9)
I. GUARDS ARE REQUIRED TO PREVENT FALLS OVER THE OPEN SIDE WHEN MEANS OF EGRESS IS MORE THAN 30 IN. ABOVE FLOOR OR GRADE BELOW. (FBC 1012)
J. GUARDRAIL HEIGHT MINIMUM: 42 IN. (FFPC 6TH ED 7.2.2.4.5.2)
K. OPEN GUARDS SHALL HAVE INTERMEDIATE RAILS OR ORNAMENTAL PATTERN TO PREVENT 4 IN. DIAMETER SPHERE FROM PASSING THROUGH ANY OPENING UP TO A HEIGHT OF 34 INCHES.
L. FOR OPEN GUARDS, FROM A HEIGHT OF 34 INCHES TO 42 INCHES ABOVE THE ADJACENT WALKING SURFACES, A SPHERE 8 INCHES IN DIAMETER SHALL NOT PASS. (FBC 1012.3)

PANIC HARDWARE

1. ALL DOORS SERVING REQUIRED EXIT ENCLOSURES SHALL BE PROVIDED WITH PANIC HARDWARE OR FIRE EXIT HARDWARE COMPLYING WITH FFPC SIXTH ED 7.2.1.7, AS FOLLOWS: (FFPC 12.2.2.2.3)
   A. IT SHALL CONSIST OF A CROSS BAR OR PUSH PAD, THE ACTUATING PORTION OF WHICH EXTENDS ACROSS NOT LESS THAN ONE-HALF OF THE WIDTH OF THE DOOR LEAF.
   B. IT SHALL BE CONSTRUCTED SO THAT A HORIZONTAL FORCE NOT TO EXCEED 15 LBF ACTUATES THE CROSS BAR OR PUSH PAD AND LATCHES.
   C. IT SHALL BE MOUNTED BETWEEN 34 INCHES AND 48 INCHES ABOVE THE FLOOR.
   D. IT SHALL NOT BE EQUIPPED WITH ANY LOCKING DEVICE, SET SCREW, OR OTHER ARRANGEMENT THAT PREVENTS THE RELEASE OF THE LATCH WHEN PRESSURE IS APPLIED TO THE RELEASING DEVICE.
   E. DEVICES THAT HOLD THE LATCH IN THE RETRACTED POSITION SHALL BE PROHIBITED ON FIRE EXIT HARDWARE UNLESS LISTED AND APPROVED FOR THAT PURPOSE.
2. ASSEMBLY OCCUPANCUY: ANY DOOR IN A REQUIRED MEANS OF EGRESS FROM AN AREA HAVING AN OCCUPANT LOAD OF 50 OR MORE PERSONS SHALL BE PERMITTED TO BE PROVIDED WITH A LATCH OR LOCK ONLY IF THE LATCH OR LOCK IS PANIC HARDWARE OR FIRE EXIT HARDWARE COMPLYING WITH FFPC SIXTH ED 7.2.1.7, UNLESS PERMITTED BY ONE OF THE FOLLOWING: (1) THIS REQUIREMENT SHALL NOT APPLY TO DELAYED EGRESS LOCKS AS PERMITTED 12.2.2.2.5. (2) THIS REQUIREMENT SHALL NOT APPLY TO ACCESS CONTROLLED EGRESS DOORS AS PERMITTED IN 12.2.2.2.6.
3. ELECTRICAL ROOMS WITH EQUIPMENT RATED 1,200 AMPERES OR MORE AND OVER (6) SIX FEET WIDE THAT CONTAIN OVERCURRENT DEVICES, SWITCHING DEVICES OR CONTROL DEVICES WITH EXIT OR EXIT ACCESS DOORS SHALL BE EQUIPPED WITH PANIC HARDWARE OF FIRE EXIT HARDWARE. THE DOORS SHALL SWING IN THE DIRECTION OF EGRESS TRAVEL. (FBC 1010.110)

PANIC HARDWARE

DELAYED EGRESS LOCKS COMPLYING WITH FFPC 7.2.1.6.1 SHALL BE PERMITTED ON DOORS OTHER THAN MAIN ENTRANCE/EXIT DOORS. THE A/E WILL FILE A DETERMINATION WITH OKALOOSA COUNTY BUILDING AND FIRE PLANS EXAMINER REQUESTING THE USE OF DELAYED EGRESS DEVICES AS A MEANS OF MAINTAINING LIFE SAFETY AND SECURITY OF THE AIRPORT/AIRCRAFT OPERATIONS AREA.
FBC 1010.1.9.7: **Delayed egress locking systems shall be permitted to be installed on doors serving any occupancy except Group A**, E and H in buildings that are equipped throughout with an automatic sprinkler system in accordance with Section 903.3.1.1 or an approved automatic smoke or heat detection system installed in accordance with Section 907. The locking system shall be installed and operated in accordance with all of the following:
1. The delay electronics of the delayed egress locking system shall deactivate upon actuation of the automatic sprinkler system or automatic fire detection system, allowing immediate, free egress.
2. The delay electronics of the delayed egress locking system shall deactivate upon loss of power controlling the lock or lock mechanism, allowing immediate free egress.
3. The delayed egress locking system shall have the capability of being deactivated at the fire command center and other approved locations.
4. An attempt to egress shall initiate an irreversible process that shall allow such egress in not more than 15 seconds when a physical effort to exit is applied to the egress side door hardware for not more than 3 seconds. Initiation of the irreversible process shall activate an audible signal in the vicinity of the door. Once the delay electronics have been deactivated, rearming the delay electronics shall be by manual means only.
   Exception: Where approved, a delay of not more than 30 seconds is permitted on a delayed egress door.
5. The egress path from any point shall not pass through more than one delayed egress locking system.
   Exception: In Group I-2 or I-3 occupancies, the egress path from any point in the building shall pass through not more than two delayed egress locking systems provided the combined delay does not exceed 30 seconds.
6. A sign shall be provided on the door and shall be located above and within 12 inches (305 mm) of the door exit hardware:
   6.1.For doors that swing in the direction of egress, the sign shall read: PUSH UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 [30] SECONDS.
   6.2.For doors that swing in the opposite direction of egress, the sign shall read: PULL UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 [30] SECONDS.
   6.3.The sign shall comply with the visual character requirements in ICC A117.1.
   Exception: Where approved, in Group I occupancies, the installation of a sign is not required where care recipients who because of clinical needs require restraint or containment as part of the function of the treatment area.
7. Emergency lighting shall be provided on the egress side of the door.
8. The delayed egress locking system units shall be listed in accordance with UL 294

HORIZONTAL SLIDING DOORS

FBC 1010.1.4.3:
In other than Group H occupancies, special purpose horizontal sliding, accordion or folding door assemblies permitted to be a component of a means of egress in accordance with Exception 6 to Section 1010.1.2 shall comply with all of the following criteria:

1. The doors shall be power operated and shall be capable of being operated manually in the event of power failure.
2. The doors shall be openable by a simple method from both sides without special knowledge or effort.
3. The force required to operate the door shall not exceed 30 pounds (133 N) to set the door in motion and 15 pounds (67 N) to close the door or open it to the minimum required width.
4. The door shall be openable with a force not to exceed 15 pounds (67 N) when a force of 250 pounds (1100 N) is applied perpendicular to the door adjacent to the operating device.
5. The door assembly shall comply with the applicable fire protection rating and, where rated, shall be self-closing or automatic closing by smoke detection in accordance with Section 716.5.9.3, shall be installed in accordance with NFPA 80 and shall comply with Section 716.
6. The door assembly shall have an integrated standby power supply.
7. The door assembly power supply shall be electrically supervised.
8. The door shall open to the minimum required width within 10 seconds after activation of the operating device.

PLUMBING FIXTURES

PLUMBING FIXTURE COUNT

FIXTURES	CODE REQUIRED				DESIGNED			
	MEN	WOMEN	COMPANION	COMMON FIXT.	MEN	WOMEN	COMPANION	COMMON FIXT.
W.C.	1	2	-	-	2	8	2	-
URINALS	1	-	-	-	6	-	-	-
LAVATORIES	2	2	-	-	6	6	2	-
ADA GROUP	1	1	-	-	2	2	-	-
ADA STALL	-	-	FAA REQUIRED	-	-	-	PROVIDED	-
WATER FOUNTAINS	-	-	-	1 STD + 1 ADA	-	-	-	2 STD + 2 ADA
JANITOR SINK	-	-	-	-	-	-	-	2

Guide for Airport Terminal Restroom Planning & Design (2015)
Pages 13 & 14

Design Passenger = EQA x 158 x 0.80
5 x 158 x 0.80 = 632

Peak 20 Min Passanger Demand = 632 x 0.50 = 316

Design Factor = 316 x 0.50 = 158.25 ≈ 158
316 x 0.60 = 189.60 ≈190
(Generic utilization rate for passangers)

MAX men fixture = DF x Male %
190 x 0.50 / 13
7.3 ≈ 7
Womens Fixtures = 7.30 x 1.25 - Table 2.2 Assumes Female increase Factor of 1.25
9.125 ≈ 9

Anticipated MAX # of Passengers per aircraft
158 - 80% Load Factor
50% = Peak 20% for Origin and Destination Airports

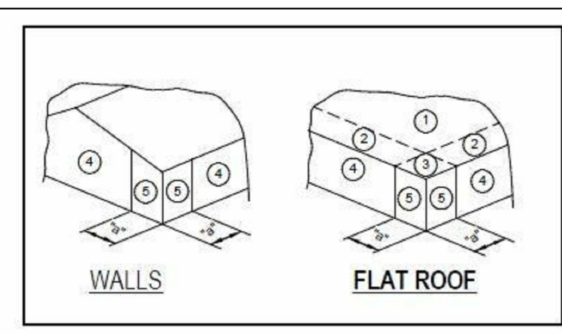
Tables 2.1 Equivalent Aircraft Index
Group III = 1.0 EQA
1.0 EQA x 5 Gates = 5 EQA

Table 2.3 O&D Airports @ 60% utilization Table
Men 6 -7
Women 7.5 ≈ 8 to 8.75 ≈ 9

Restrooms are group for single sided gate concourse Layout ± 200' from gate MAX.

SEE SHEET A452

COMPONENTS OF CLADDING



ULTIMATE C&C WIND PRESSURES (ASCE 7-10)

BUILDING	a (FT)	Vult (MPH)	Vasd (MPH)	A (SF)	ZONE 1 (PSF)	ZONE 2 (PSF)	ZONE 3 (PSF)	ZONE 4 (PSF)	ZONE 5 (PSF)	ZONE 2H (PSF)	ZONE 3H (PSF)
MAIN	5.5	154	119	<10	+22.2 -54.5	+49.9 -91.5	+49.9 -91.5	+49.9 -54.1	+49.9 -66.5	- -78.6	- -78.6
				20	+20.8 -53.1	+47.7 -81.8	+47.7 -81.8	+47.7 -51.9	+47.7 -62.1	- -	- -
				50	+19 -51.3	+44.8 -68.9	+44.8 -68.9	+44.8 -48.9	+44.8 -56.3	- -	- -
				100+	+17.6 -49.9	+42.6 -59.1	+42.6 -59.1	+42.6 -46.7	+42.6 -51.9	- -	- -

ULTIMATE C&C WIND PRESSURES (ASCE 7-10)

BUILDING	a (FT)	Vult (MPH)	Vasd (MPH)	A (SF)	ZONE 1 (PSF)	ZONE 2 (PSF)	ZONE 3 (PSF)
CANOPY	3.0	154	119	≤9	+47.1 -42.7	+70.6 -65.7	+94.1 -128.2
				9< A ≤36	+47.1 -42.7	+70.6 -65.7	+70.6 -65.7
				>36	+47.1 -42.7	+47.1 -42.7	+47.1 -42.7

ULTIMATE C&C WIND PRESSURE PLAN NOTES:
1. WIND PRESSURE TABLE IS BASED ON FBC 2014/ASCE 7-10 ULTIMATE WIND SPEED, PRESSURES SHOWN ABOVE ARE ULTIMATE COMPONENTS AND CLADDING PRESSURES.

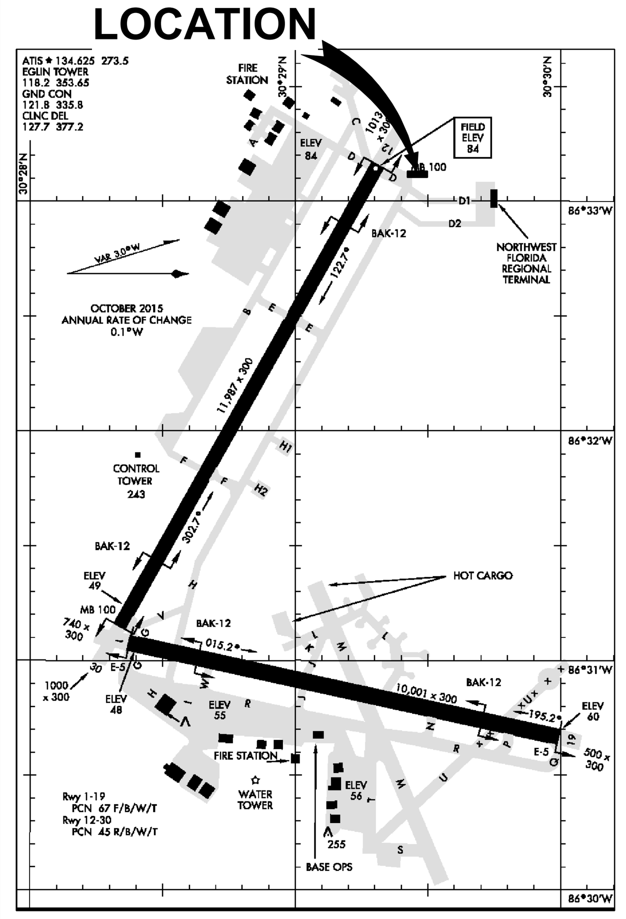
BASIS OF DESIGN: **SEE SHEET AL002**
MORE INFORMATION: **SEE SHEET S003**

ACCESS CONTROLLED EGRESS DOORS

ACCESS-CONTROLLED EGRES DOORS (FBC 1010.1.9.8). THE ELECTRIC LOCKS ON SENSOR RELEASED DOORS LOCATED IN A MEANS OF EGRESS IN BUILDINGS WITH OCCUPANCY IN GROUP A, B, & M; AND ENTRACNCE DOORS TO TENANT SPACES IN OCCUPANCY IN GROUP A, B, & M ARE PERMITTED WHERE INSTALLED AND OPERATED IN ACCORDANCE WITH THE FOLLOWING CRITERIA:
1. The sensor shall be installed on the egress side, arranged to detect an occupant approaching the doors. The doors shall be arranged to unlock by a signal from or loss of power to the sensor.
2. Loss of power to the lock or locking system shall automatically unlock the doors.
3. The doors shall be arranged to unlock from a manual unlocking device located 40 inches to 48 inches (1016 mm to 1219 mm) vertically above the floor and within 5 feet (1524 mm) of the secured doors. Ready access shall be provided to the manual unlocking device and the device shall be clearly identified by a sign that reads “PUSH TO EXIT.” When operated, the manual unlocking device shall result in direct interruption of power to the lock—independent of other electronics—and the doors shall remain unlocked for not less than 30 seconds.
4. Activation of the building fire alarm system, where provided, shall automatically unlock the doors, and the doors shall remain unlocked until the fire alarm system has been reset.
5. Activation of the building automatic sprinkler system or fire detection system, where provided, shall automatically unlock the doors. The doors shall remain unlocked until the fire alarm system has been reset.
6. The door locking system units shall be listed in accordance with UL 294.

PROJECT LOCATION

PROJECT LOCATION



PROJECT DESCRIPTION

PROJECT ADDRESS:
1701 State Road 85N,
Eglin AFB, FL 32542-1498

Single story concrete masonry bearing wall construction with open webbed steel joist single ply membrane roofing structure. The project consists of a Satellite "Airside" Concourse Building with 2 holdrooms in base bid with alternates totaling a maximum ultimate build of 5 holdrooms, concessions, restrooms and TSA Passenger Security Screening Check Point.

APPLICABLE CODES

Florida Building Code Building -6th Edition (2017)
Florida Building Code Energy Conservation -6th Edition (2017)
Florida Building Code Accessibility -6th Edition (2017)
Florida Fire Prevention Code -6th Edition (2017)
Florida Building Code Plumbing -6th Edition (2017)
Florida Building Code Mechanical -6th Edition (2017)
NFPA 1, Uniform Fire Code, 2012 with Florida modifications
NFPA 13, 2010 Edition, Standard for Installation of Fire Sprinkler System
NFPA 70, 2011 Edition, National Electrical Code
NFPA 90A, 2012 Edition, Standard for Installation of Air-Conditioning Ventilation Systems
NFPA 10, Standard for Portable Fire Extinguishers, 2010
NFPA 72, National Fire Alarm and Signaling Code, 2010
NFPA 101, Life Safety Code, 2012 with Florida Modification
NFPA 419

FL ADMINISTRATIVE CODES & STATUTES

OCCUPANCY CLASIFICATION

USE AND OCCUPANCY CLASSIFICATION FBC Chapter 3
A-3
SECTION 306 Waiting areas in transportation terminals

BUILDING HEIGHTS AND AREAS

GENERAL BUILDING HEIGHTS AND AREAS FBC Chapter 5

ALLOWABLE BUILDING HEIGHTS AND AREAS FBC TABLE 503
TYPE OF CONSTRUCTION TYPE II-A - OCCUPANCY GROUP A-3
ALLOWABLE HEIGHT 85' - 0"
ALLOWABLE NUMBER OF STORIES 4
ALLOWABLE BUILDING AREA 62,000

MEZZANINES AND EQUIPMENT PLATFORMS FBC SECTION 505.2
ALLOWABLE MEZZANINE AND EQUIPMENT PLATFORM AREA 11039 SF

ACTUAL BUILDING HEIGHTS AND AREAS CHECK
ALLOWABLE HEIGHT WITH INCREASE 60' - 0" ≥ 22' - 7" ACTUAL -- OK!
ALLOWABLE NUMBER OF STORIES WITH INCREASE 4 ≥ 1 ACTUAL -- OK!
ALLOWABLE BUILDING AREA WITH INCREASE 62000 SF ≥ 33118 SF ACTUAL -- OK!
ALLOWABLE MEZZANINE AND EQUIPMENT PLATFORM AREA 11039 SF ≥ 0 SF ACTUAL -- OK!

TYPE OF CONSTRUCTION

CONSTRUCTION TYPE FBC Chapter 6
TYPE II-B

FIRE-RESISTANCE RATING REQUIREMENTS FOR BUILDING ELEMENTS (HOURS) FBC TABLE 601
Primary structural frame 0 hr
Bearing walls Exterior 0 hr
Bearing walls Interior 0 hr
Non-Bearing Exterior Walls **SEE TABLE 602**
Non-Bearing Walls Interior 0 hr
Floor construction and associated secondary members (see Section 202) 0 hr
Roof construction and associated secondary members (see Section 202) 0 hr

FIRE-RESISTANCE RATING REQUIREMENTS FOR EXTERIOR WALLS BASED ON FIRE SEPARATION DISTANCE FBC TABLE 602
FIRE SEPARATION DISTANCE = X (Feet) Values established by type of Construction Type and Occupancy Group
X < 5 1 hr
5 ≤ X < 10 1 hr
10 ≤ X < 30 0 hr
X ≥ 30 0 hr

FIRE AND SMOKE PROTECTION

FIRE AND SMOKE PROTECTION FEATURES FBC Chapter 7
DEGREE OF OPENING PROTECTION Protected (P)

MAXIMUM AREA OF EXTERIOR WALL OPENINGS BASED ON FIRE SEPARATION DISTANCE AND DEGREE OF OPENING PROTECTION FBC TABLE 705.8

FIRE SEPERATION DISTANCE (Feet)	ALLOWABLE AREA
0 to less than 3	0%
3 to less than 5	15%
5 to less than 10	25%
10 to less than 15	45%
15 to less than 20	75%
20 to less than 25	100%
25 to less than 30	100%
30 or greater	100%

0% = NOT PERMITED
100% = NO LIMIT

RESISTANCE RATINGS BASED ON OCCUPANCY GROUP A

FIRE WALL FIRE-RESISTANCE RATINGS FBC TABLE 706.4
FIRE-RESISTANCE RATING 3 HOURS

FIRE-RESISTANCE RATING REQUIREMENTS FOR FIRE BARRIER ASSEMBLIES OR HORIZONTAL ASSEMBLIES BETWEEN FIRE AREAS FBC TABLE 707.3.10
FIRE-RESISTANCE RATING 2 HOURS

INTERIOR FINISHES

INTERIOR FINISHES FBC Chapter 8
INTERIOR WALL AND CEILING FINISH REQUIREMENTS BY OCCUPANCYSPRINKLERED
Exit Enclosures and Exit Passage Ways B
Corridors B
Rooms and Enclosed spaces C

MEANS OF EGRESS SIZING

REQUIRED CAPACITY BASED ON OCCUPANT LOADS FBC Section 1005.3
BUILDING OCCUPANT LOAD 1540
§1005.3.1 STAIRWAYS @ 0.3" PER OCCUPANT | 19' - 3 5/8"
§1005.3.2 OTHER EGRESS COMPONENTS @ 0.2" PER OCCUPANT | 12' - 9 3/8"
**ASSUMPTION IS MADE OF BUILDING OCCUPANT LOAD DIVIDED BY 2. INDIVIDUAL COMPONENTS SHALL COMPLY WITH WIDTHS BASED ON THEIR LOAD BUT NO LESS THAN 34" PROVIDED.*

SEE AL211 FOR FOR ADDITONAL REQUIREMENTS

NOTE for NFPA 419 Review: This is a ground load facility. Meaning; there are no jet bridges nor are they anticipated to be installed. assumption made in event of emergency passengers onboard aircraft will egress directly to hard stand apron and not into building.

HEADROOM

1. MEANS OF EGRESS SHALL BE DESIGNED AND MAINTAINED TO PROVIDE HEADROOM IN ACCORDANCE WITH OTHER SECTIONS OF THIS CODE, AND SUCH HEADROOM SHALL BE NOT LESS THAN 7 FT 6 IN. (2285 MM), WITH PROJECTIONS FROM THE CEILING NOT LESS THAN 6 FT 8 IN. (2030 MM) WITH A TOLERANCE OF-3/4 IN. (-19 MM), ABOVE THE FINISHED FLOOR, UNLESS OTHERWISE SPECIFIED BY THE FOLLOWING: FFPC SIXTH EDITION.

2. HEADROOM IN INDUSTRIAL EQUIPMENT ACCESS AREAS AS PROVIDED IN FFPC SIXTH EDITION 40.2.5.2 SHALL BE PERMITTED.

WALL DEMARCATION

FFPC SITH EDITION, NFPA1, 12.3
ALL FIRE-RESISTIVE CONSTRUCTION INCLUDING FIRE BARRIERS, FIRE WALLS, AND SMOKE BARRIERS SHALL BE PERMANENTLY STENCEILED WITH LETTERS NO LESS THAN SIX (6) INCHES IN HEIGHT ON THE PARTITION READING SUBSTANTIALLY AS FOLLOWS:

"FIRE AND SMOKE BARRIER -- PROTECT ALL OPENINGS"

TENANT SEPARATIONS

FLORIDA BUILDING CODE SECTION 709.1, EXCEPTION 4:
OTHER THAN DWELLING UNITS OR SLEEPING UNITS, WALLS USED TO SEPARATE INDIVIDUAL TENANT SPACES SHALL NOT BE REQUIRED TO HAVE A FIRE-RESISTANCE RATING WHEN THE BUILDING IS PROTECTED BY A COMPLETE AUTOMATIC SPRINKLER SYSTEM INSTALLED IN ACCORDANCE WITH FBC SECTION 903.3.1.1.

MIXED OCCUPANCY

FLORIDA BUILDING CODE SECTION 508.3
A. THE BUILDING IS CLASSIFIED AS A NON-SEPARATED MIXED OCCUPANCY.
B. NO SEPARATION IS REQUIRED. (FBC 508.3.3)
C. NON-SEPARATED OCCUPANCIES SHALL BE INDIVIDUALLY CLASSIFIED IN ACCORDANCE WITH SECTION 302.1. THE REQUIREMENTS OF THIS CODE SHALL APPLY TO EACH PORTION OF THE BUILDING BASED ON THE OCCUPANCY CLASSIFICATION OF THAT SPACE EXCEPT THAT THE MOST RESTRICTIVE APPLICABLE PROVISIONS OF SECTION 403 AND CHAPTER 9 SHALL APPLY TO THE BUILDING OR PORTION THEREOF IN WHICH THE NON-SEPARATED OCCUPANCIES OCCURRED. (FBC 508.3.1)
D. THE ALLOWABLE BUILDING AREA AND HEIGHT OF THE BUILDING OR PORTION THEREOF SHALL BE BASED ON THE MOST RESTRICTIVE ALLOWANCES FOR THE OCCUPANCY GROUPS UNDER CONSIDERATION FOR THE TYPE OF CONSTRUCTION OF THE BUILDING IN ACCORDANCE WITH SECTION 503.1.

EXIT SIGNAGE

ACCESS TO ALL EXITS SHALL BE PROVIDED THROUGHOUT THE MEANS OF EGRESS BY APPROVED, READILY VISIBLE SIGNS, IN ACCORDANCE WITH FFPC SITH EDITION 7.10. SIGNAGE SHALL COMPLY WITH ICC/ANSI A117.1, AMERICAN NATIONAL STANDARD FOR ACCESSIBLE AND USABLE BUILDINGS AND FACILITIES. SIGN PLACEMENT SHALL BE SUCH THAT NO POINT IN THE EXIT ACCESS CORRIDOR IS IN EXCESS OF THE RATED VIEWING DISTANCE OR 100 FT, WHICHEVER IS LESS, FROM THE NEAREST SIGN. **SEE AL211 FOR LOCATIONS**

EMERGENCY LIGHTING

EMERGENCY LIGHTING SHALL BE PROVIDED IN ACCORDANCE WITH FFPC 7.9. **SEE ELECTRICAL DRAWINGS FOR PLACEMENT**

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AA-C002208
MLM JOB #: TYPE PROPERTY
MLM-MARTIN ARCHITECTS, INC.

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	12" = 1'-0"

Drawing Title:
BUILDING CODE ANALYSIS
BID DOCUMENTS

Drawing No.:
AL001

PRODUCT APPROVAL SPECIFICATION SHEET

As required by Florida Statue 553.842 & Florida Adminstrative Code 9B-72, please provide product numbers as applicable to project. Product suppliers should provide approval number for purchased items.

Category/Subcategory	Manufacturer	Product Description	Design Pressure +/-	Wind Borne Debris Protection ***	Approval Number(s)
1. EXTERIOR DOORS				Identify impact glass/shutter/plywood	
A. SWINGING	STEELCRAFT	SERIES H	SEE SHEET S003		NOA 17-1206.03
B. SLIDING	STANLEY	DURA-STORM 3000	SEE SHEET S003		FL23979
C. SECTIONAL					
D. ROLL UP					
E. AUTOMATIC	STANLEY	DURA-STORM 3000	SEE SHEET S003		FL23979
F. OTHER					
2. WINDOWS					
A. SINGLE HUNG					
B. HORIZONTAL SLIDER					
C. CASEMENT					
D. DOUBLE HUNG					
E. FIXED	KAWNEER / YKK	1630 / YHC 300 OG - WZ3	SEE SHEET S003	VIRACON IMPACT GLASS	FL16548 / FL13433.3
F. AWNING					
G. PASS THROUGH					
H. PROJECTED					
I. MULLION					
J. WIND BREAKER					
K. DUAL ACTION					
L. OTHER					
5. SHUTTERS	N/A				
A. ACCORDION					
B. BAHAMA					
C. STORM PANELS					
D. COLONIAL					
E. ROLL-UP					
F. EQUIPMENT					
G. OTHERS					
6. SKYLIGHTS	N/A				
A. SKYLIGHT					
B. OTHER					

The products listed below did not demonstrate product approval at plan review. I understand that at the time of inspection of these products, the following information must be available to the inspector on the jobsite; 1) copy of the product approval, 2) the performance characteristics which the product was tested and certified to comply with, 3) copy of the applicable manufacturers installation requirements. Further, I understand these products may have to be removed if approval cannot be demonstrated during inspection.

***** Indicate in column type of wind borne debris protection for glazing. Wind borne Debris Region 140mph and greater.**

PRODUCT APPROVAL SPECIFICATION SHEET

As required by Florida Statue 553.842 & Florida Adminstrative Code 9B-72, please provide product numbers as applicable to project. Product suppliers should provide approval number for purchased items.

Category/Subcategory	Manufacturer	Product Description	Design Pressure +/-	Wind Borne Debris Protection	Approval Number(s)
3. PANEL WALL	N/A				
A. SIDING					
B. SOFFITS					
C. EIFS					
D. STOREFRONTS					
E. CURTAIN WALLS					
F. WALL LOUVER					
G. GLASS BLOCK					
H. MEMBRANE					
I. GREENHOUSE					
J. OTHER					
4. ROOFING PRODUCTS					
A. ASPHALT SHINGLES					
B. UNDERLAYMENTS					
C. ROOFING FASTENERS					
D. METAL ROOFING					
E. WOOD SHINGLES					
F. ROOFING TILES					
G. ROOFING INSULATION					
H. WATERPROOFING					
I. BUILT UP ROOFING					
J. MODIFIED BITUMEN					
K. SINGLE PLY ROOF	FIBERTITE	FIBERTITE-SM	SEE SHEET S003		FL4930-R14 S-11
L. ROOFING SLATE					
M. CEMENTS-ADHESIVES					
N. LIQUID APPLIED ROOF SYSTEMS					
O. ROOF TILE ADHESIVE					
P. SPRAY APPLIED POLYURETHANE ROOF					
Q. OTHER					

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Category/Subcategory	Manufacturer	Product Description	Design Pressure +/-	Wind Borne Debris Protection	Approval Number(s)
7. STRUCTURAL COMPONENTS					
A. WOOD CONNECTORS ANCHORS					
B. TRUSS PLATES					
C. ENGINEERED LUMBER					
D. RAILING	Calculated				Delegated Design
E. COOLERS-FREEZERS					
F. CONCRETE ADMIXTURES					
G. MATERIAL					
H. INSULATION FORMS					
I. PLASTICS					
J. DECK-ROOF					
K. WALL					
L. SHEDS					
M. OTHER					
8. NEW EXTERIOR ENVELOPE PRODUCTS					
A.					
B.					

The products listed below did not demonstrate product approval at plan review. I understand that at the time of inspection of these products, the following information must be available to the inspector on the jobsite; 1) copy of the product approval, 2) the performance characteristics which the product was tested and certified to comply with, 3) copy of the applicable manufacturers installation requirements. Further, I understand these products may have to be removed if approval cannot be demonstrated during inspection.

APPLICANT SIGNATURE DATE

ITEMS LISTED HERE ARE BASIS OF DESIGN. FINAL SELECTION BY CONTRACTOR VIA ACCEPTED SUBMITTALS STAMPED BY A/E WILL NEED TO BE PROVIDED TO AUTHORITY HAVING JURISDICTION.

C19-2811- AP
Construction of Satellite Concourse 'C'

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AA-C002208
ALM 308 F-TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	**MLM-19672**
Designed By:	**MLM, MAM**
Drawn By:	**ST, CC, DM, CB**
Checked By:	**MAM**
Issue Date:	**30-NOV-2020**
Drawing Scale:	**NO SCALE**

Drawing Title:

PRODUCT APPROVAL LISTING

BID DOCUMENTS

Drawing No.:

AL002

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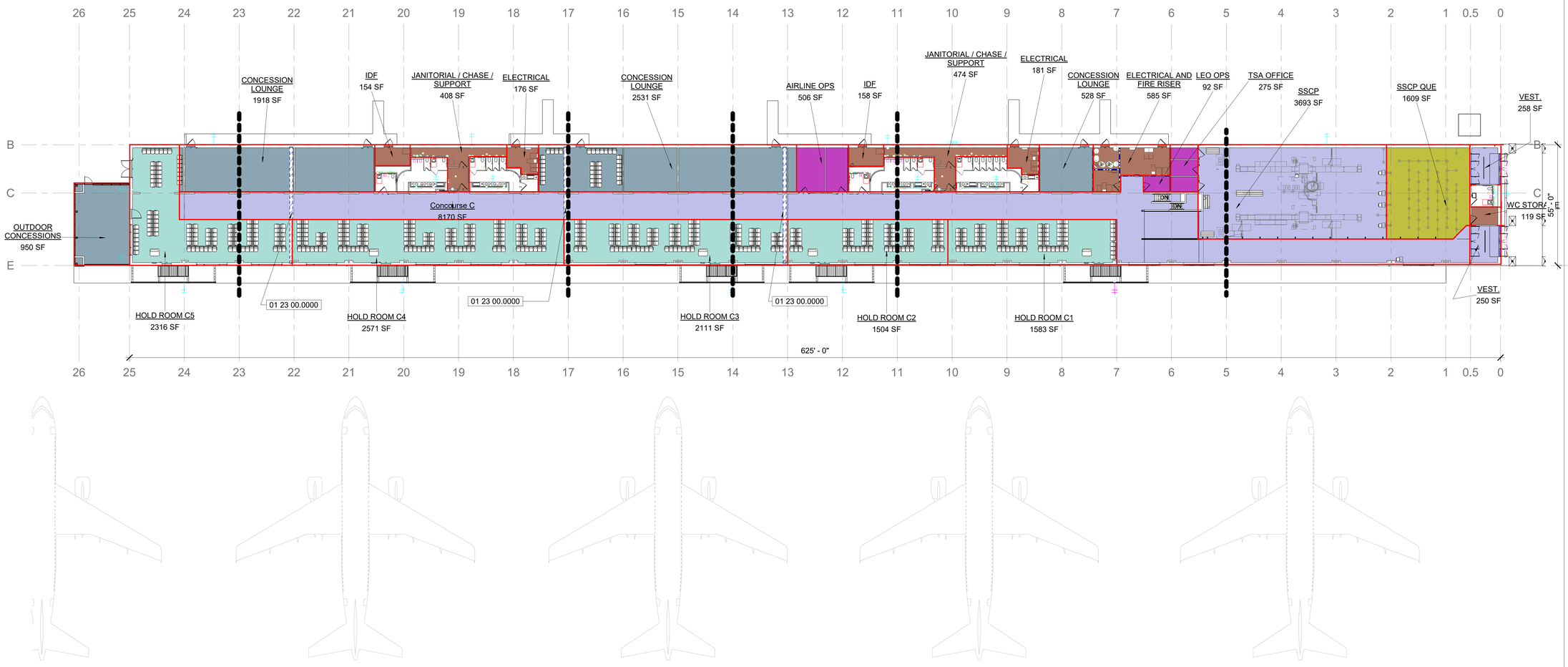

D1 OVERALL OCCUPANCY FUNCTION PLAN

1" = 20'-0"

NORTH

FUNCTION LEGEND

300 SF	Accesory storage areas, mechanical equipment room
100 SF	Buisness Areas
100 SF	Concourse
5 SF	Standing Space Concentrated
15 SF	Unconcentrated (tables and chairs)
15 SF	Waiting areas

OCCUPANT LOAD (FBC TABLE 1004.1.2)

Name	Area	Occ Function	Occ Load Factor	Occupant Count
HOLD ROOM C5	2316 SF	Waiting areas	15 SF	155
HOLD ROOM C4	2571 SF	Waiting areas	15 SF	172
HOLD ROOM C3	2111 SF	Waiting areas	15 SF	141
HOLD ROOM C2	1504 SF	Waiting areas	15 SF	101
HOLD ROOM C1	1583 SF	Waiting areas	15 SF	106
AIRLINE OPS	506 SF	Buisness Areas	100 SF	6
LEO OPS	92 SF	Buisness Areas	100 SF	1
CONCESSION LOUNGE	2531 SF	Unconcentrated (tables and chairs)	15 SF	169
CONCESSION LOUNGE	528 SF	Unconcentrated (tables and chairs)	15 SF	36
Concourse C	8170 SF	Concourse	100 SF	82
SSCP QUE	1609 SF	Standing Space Concentrated	5 SF	322
IDF	154 SF	Accesory storage areas, mechanical equipment room	300 SF	1
IDF	158 SF	Accesory storage areas, mechanical equipment room	300 SF	1
SSCP	3693 SF	Concourse	100 SF	37
ELECTRICAL AND FIRE RISER	585 SF	Accesory storage areas, mechanical equipment room	300 SF	2
WC STORAGE	119 SF	Accesory storage areas, mechanical equipment room	300 SF	1
VEST.	258 SF	Concourse	100 SF	3
VEST.	250 SF	Concourse	100 SF	3
TSA OFFICE	275 SF	Buisness Areas	100 SF	3

Name	Area	Occ Function	Occ Load Factor	Occupant Count
ELECTRICAL	181 SF	Accesory storage areas, mechanical equipment room	300 SF	1
JANITORIAL / CHASE / SUPPORT	474 SF	Accesory storage areas, mechanical equipment room	300 SF	2
ELECTRICAL	176 SF	Accesory storage areas, mechanical equipment room	300 SF	1
JANITORIAL / CHASE / SUPPORT	408 SF	Accesory storage areas, mechanical equipment room	300 SF	2
CONCESSION LOUNGE	1918 SF	Unconcentrated (tables and chairs)	15 SF	128
OUTDOOR CONCESSIONS	950 SF	Unconcentrated (tables and chairs)	15 SF	64
	33118 SF			1540

KEYNOTES

NO.

01 23 00.0000 LIMITS OF ALTERNATE WORK, SEE SPECIFICATIONS FOR MORE INFORMATION.

SCALE: 1" = 20'-0"

0 5' 10' 20' 40'

OKALOOSA COUNTY

FLY VPS

C19-2811- AP Construction of Satellite Concourse 'C'

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Drawing Scale:	1" = 20'-0"

Drawing Title:

LIFE SAFETY OCCUPANT LOAD PLAN

BID DOCUMENTS

Drawing No.:

AL111

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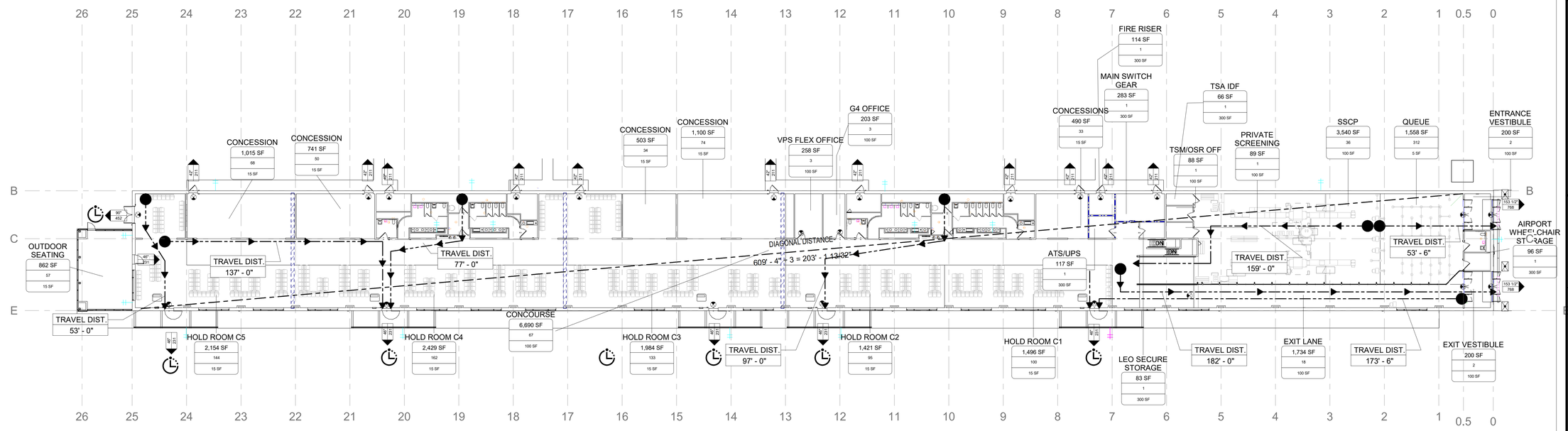

D1 OVERALL EGRESS PLAN

1" = 20'-0"

NORTH

EGRESS PLAN LEGEND

CAPACITY OF EGRESS COMPONENT
- DIRECTION OF TRAVEL
- CLEAR WIDTH
- CAPACITY PER FBC§1005.3.2

ROOM OCCUPANT LOAD FBC§1005.3
- Name: AREA OF ROOM/SPACE
- 150 SF: REQ'D OCCUPANT LOAD CAPACITY
- Occ Load: OCCUPANT LOAD FACTOR FBC§ 1004.1.2 - SEE SHEET **AL111**
- SF

EXIT TRAVEL DISTANCE FBC§1017.2
- TRAVEL DIST. 0' - 0": TRAVEL DISTANCE
- POINT OF BEGINING
- POINT OF DISCHARGE
- PATH OF TRAVEL

DOORWAY CONFIG. FBC§1007.1.1
- DIAGONAL DISTANCE 15' - 0" ÷ 3 = 5' - 0": MEASURABLE DISTANCE
- MINIMUM DISTANCE BETWEEN EXITS FBC§1007.1.1-EXCEPTION 2

EXIT SIGN FBC §1013
- LLUMINATED FACE FBC §1013.3
- DIRECTIONAL GRAPHICS

DELAYED EGRESS INDICATION

SCALE: 1" = 20'-0"

0 5' 10' 20' 40'

DISTANCE LIMITATIONS

OCCUPANCY	MAXIMUM TRAVEL DISTANCE TO EXIT (FBC TABLE 1017.2)	MAXIMUM DEAD-END CORRIDOR LENGTH (FBC TABLE 1020.4)	MAXIMUM COMMON PATH OF TRAVEL (FBC TABLE 1006.2.1)
ASSEMBLY (A)	250'	20'	75'
BUSINESS (B)	300'	50' (1020.4(2))	100'
MERCENTILE (M)	250'	50' (1020.4(2))	75'

QUANTITY OF MEANS OF EGRESS

FBC 1006.3.1 MINIMUM NUMBER OF EXITS REQUIRED: 4
NUMBER OF EXITS PROVIDED: 8

OKALOOSA COUNTY

FLY VPS

C19-2811- AP Construction of Satellite Concourse 'C'

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Drawing Title:

EGRESS PLAN

BID DOCUMENTS

Drawing No.:

AL211

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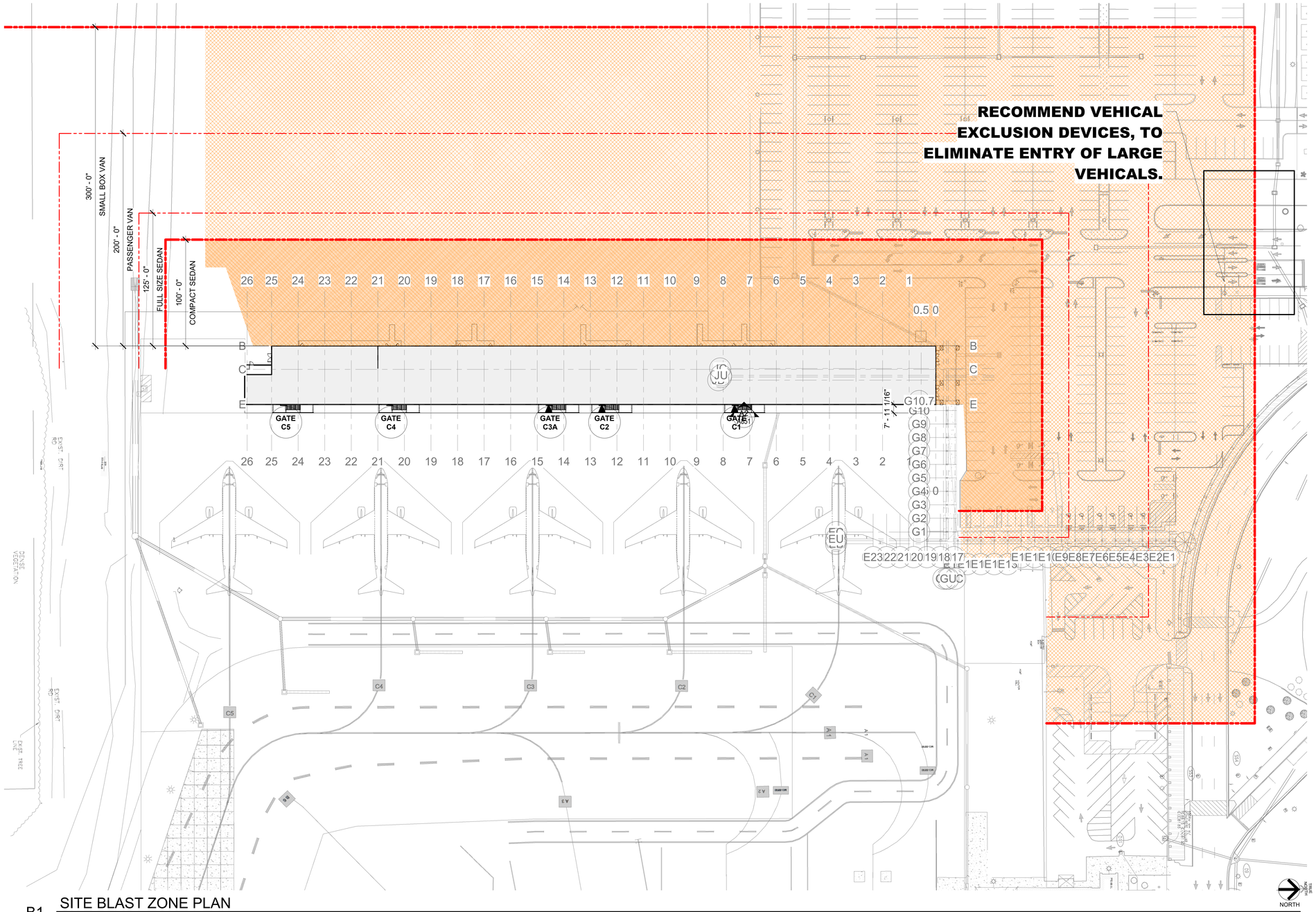

B1 SITE BLAST ZONE PLAN

1" = 40'-0"

WARNING: This record contains Sensitive Security Information that is controlled under 49 CFR parts 15 and 1520 or that may be otherwise exempt from public disclosure pursuant to Florida Statutes sections 331.22, 119.071, and/or 281.301. No part of this record may be disclosed to persons without a "need to know", as defined in 49 CFR parts 15 and 1520, except with the written permission of both Okaloosa County Airports and either the Administrator of the Transportation Security Administration or the Secretary of Transportation. Unauthorized release may result in civil penalty or other action. For U.S. government agencies, public disclosure is governed by 5 USC 552 and 49 CFR parts 15 and 1520.

HAZARD FIELDS

BOX VAN EXCLUSION ZONE

COMPACT VEHICAL EXCLUSION ZONE

SCALE: 1" = 40'-0"

0 10' 20' 40' 80'

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
SUITE 107
MAITLAND, FL 32751
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AA-C002208
ALM JOB # TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	1" = 40'-0"

Drawing Title:

BLAST MITIGATION PLAN

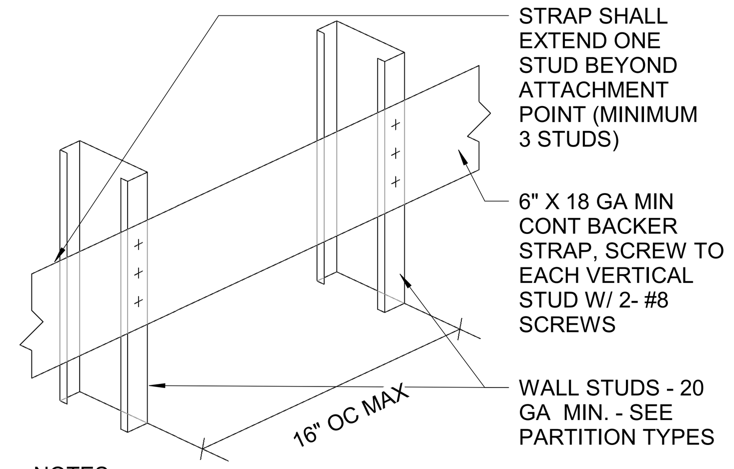
BID DOCUMENTS

Drawing No.:

AL281

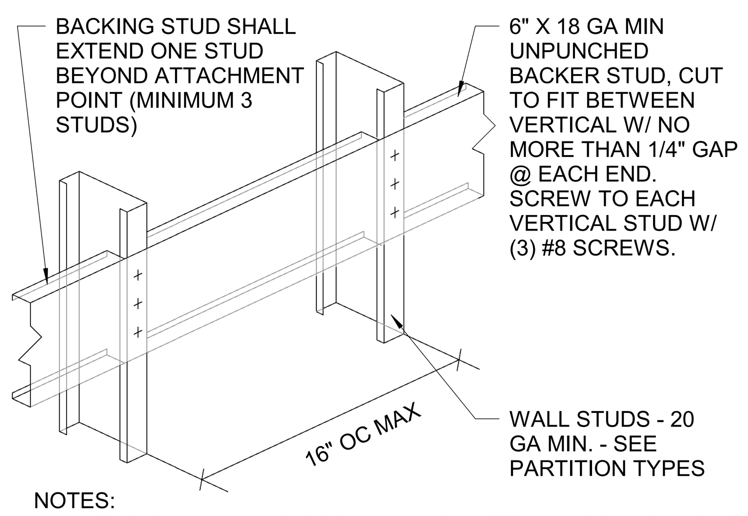
BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt
12/8/2020 5:54:48 PM

WALL BLOCKING



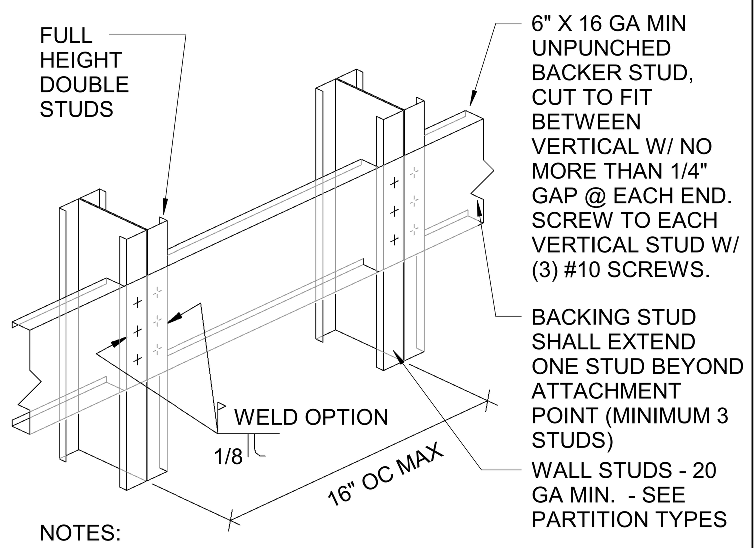
NOTES:
1. TYPICAL BACKING FOR DOOR WALL STOPS, COAT HOOKS, MOP RACKS, & LIGHT WEIGHT ACCESSORIES
2. THIS DETAIL MAY BE USED WHEN THE LENGTH OF THE CABINET OR EQUIPMENT DISTRIBUTES UP TO 30 LBS PER STUD SPACING.
3. 2x6 MIN. FR WOOD BLOCKING MAY BE USED IN PLACE OF METAL BACKING.

WALL BLOCKING - LIGHT (UNDER 30 LBS)



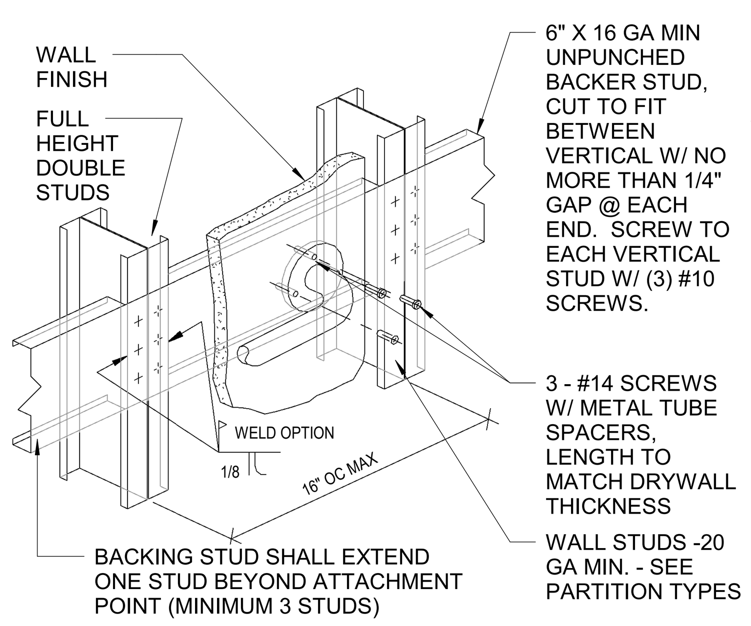
NOTES:
1. TYPICAL BACKING FOR WALL MOUNTED HANDRAILS, LIGHT FIXTURES, AND PATIENT SERVICE MODULES
2. THIS DETAIL MAY BE USED WHEN THE LENGTH OF THE CABINET OR EQUIPMENT DISTRIBUTES UP TO 50 LBS PER STUD SPACING.
3. 2x6 MIN. FR WOOD BLOCKING MAY BE USED IN PLACE OF METAL BACKING.

WALL BLOCKING - MEDIUM (31 LBS - 50 LBS)



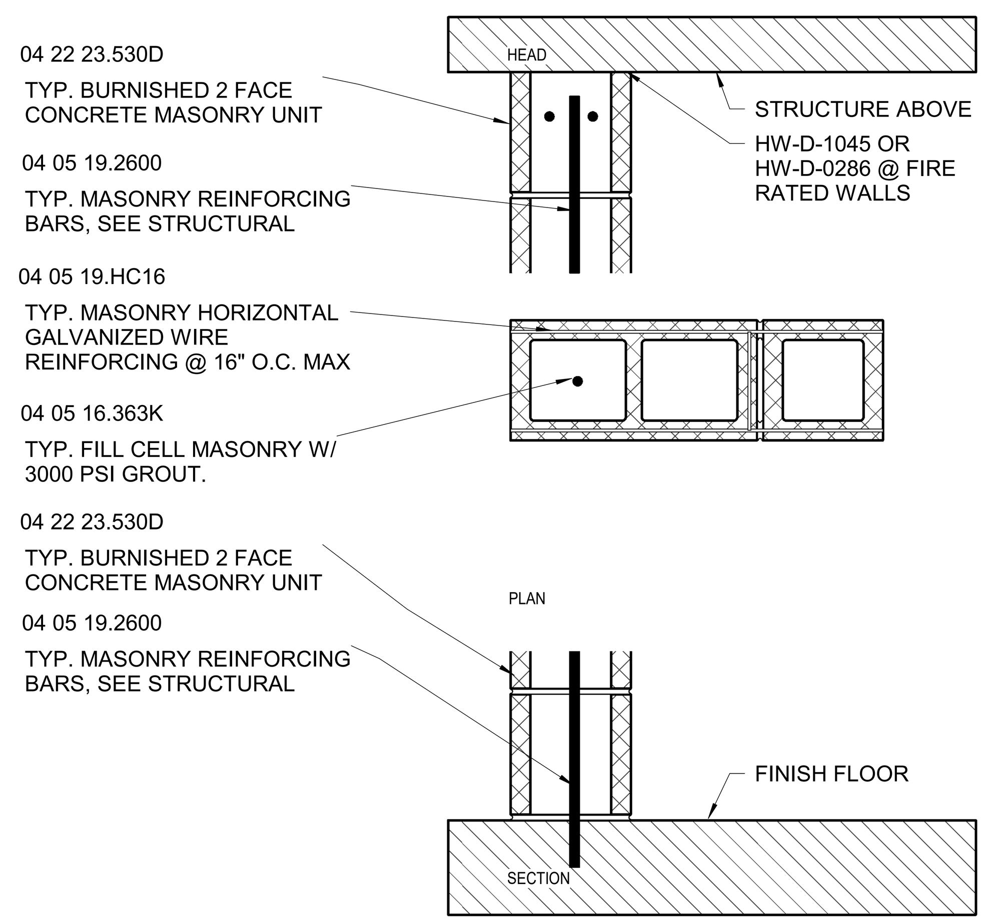
NOTES:
1. TYP. BACKING FOR WALL MOUNTED TOILET PARTITIONS, WALL MOUNTED COUNTERS AND LAVATORIES, AND WALL/FLOOR MOUNTED CASEWORK
2. THIS DETAIL MAY BE USED WHEN THE LENGTH OF THE CABINET OR EQUIPMENT DISTRIBUTES UP TO 150 LBS PER STUD SPACING.
3. DOUBLE STUDS NOT REQUIRED IF WALL IS BRACED AT 9'-0" MAX. A.F.F.
4. 2x6 MIN. FR WOOD BLOCKING MAY BE USED IN PLACE OF METAL BACKING.

WALL BLOCKING - HEAVY (51 LBS - 150 LBS)



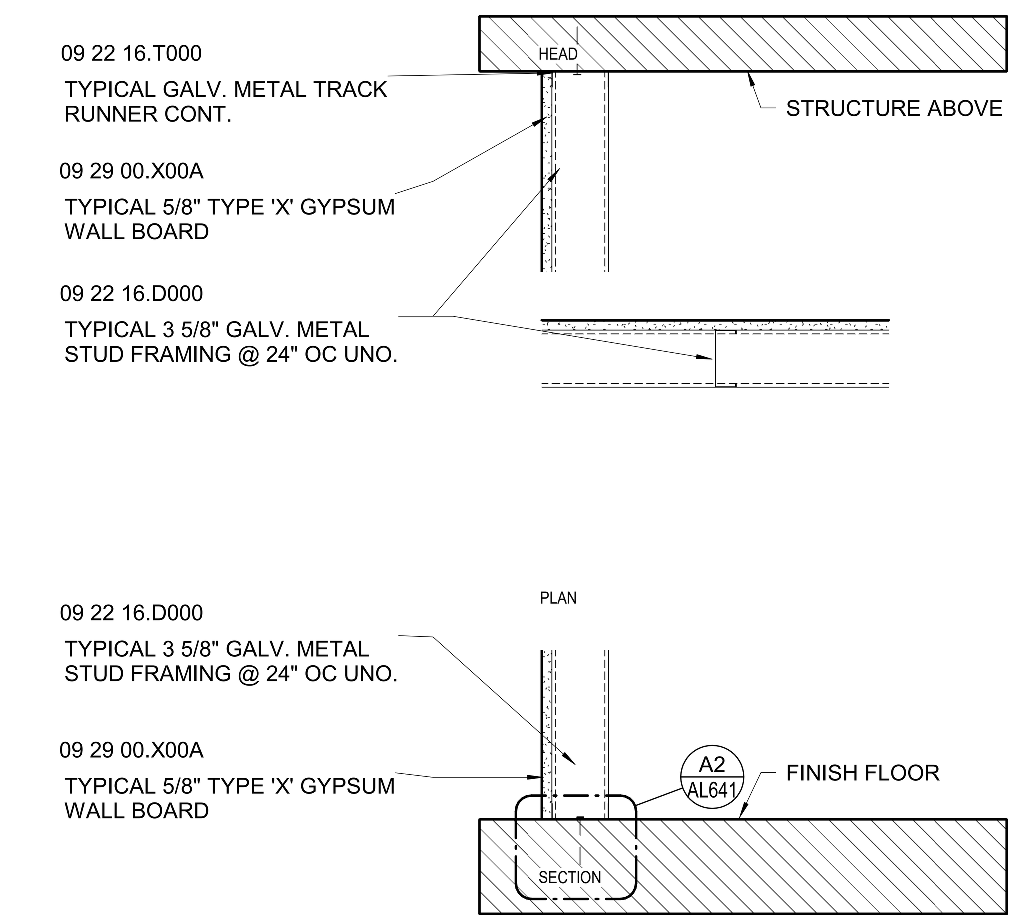
NOTES:
1. TYPICAL BACKING FOR GRAB BARS
2. DOUBLE STUDS NOT REQ'D IF WALL IS BRACED @ 9'-0" MAX. A.F.F.
3. 2x6 MIN. FR WOOD BLOCKING MAY BE USED IN PLACE OF METAL BACKING.

WALL BLOCKING - VERY HEAVY (151 LBS - 250 LBS)



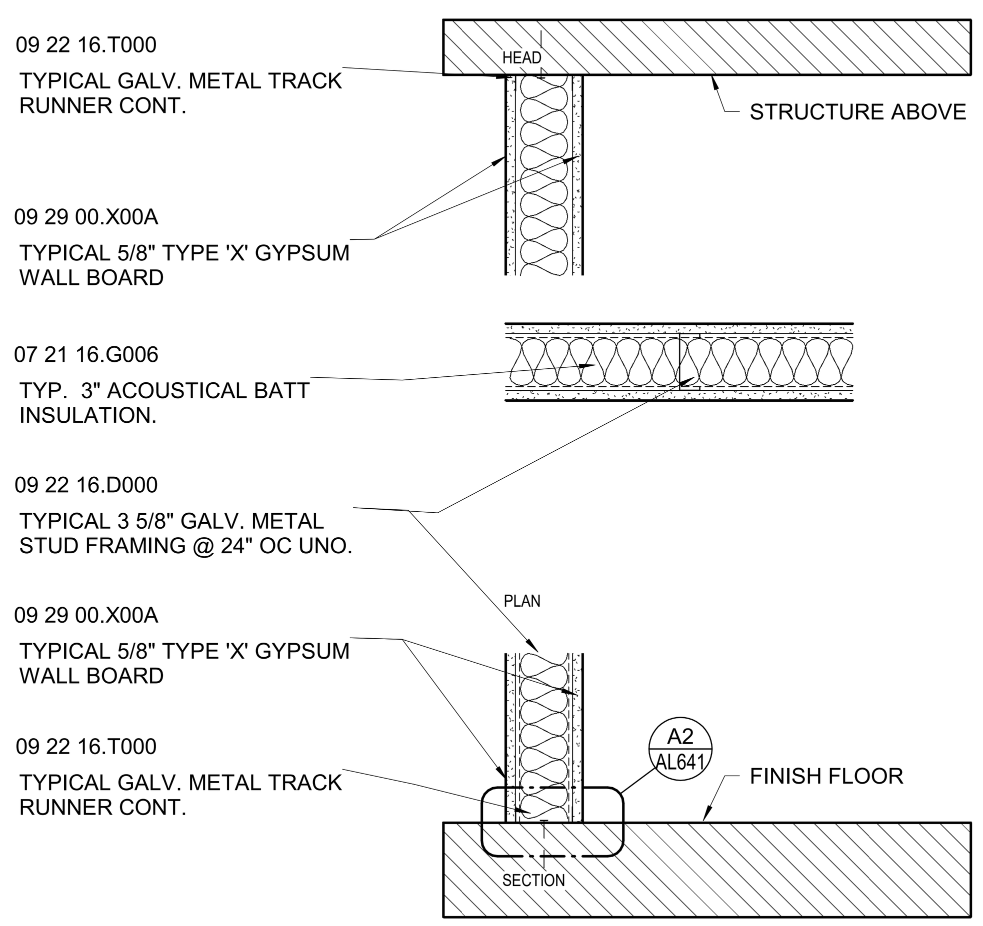
D2 [B] WALL SYSTEM

1 1/2" = 1'-0"



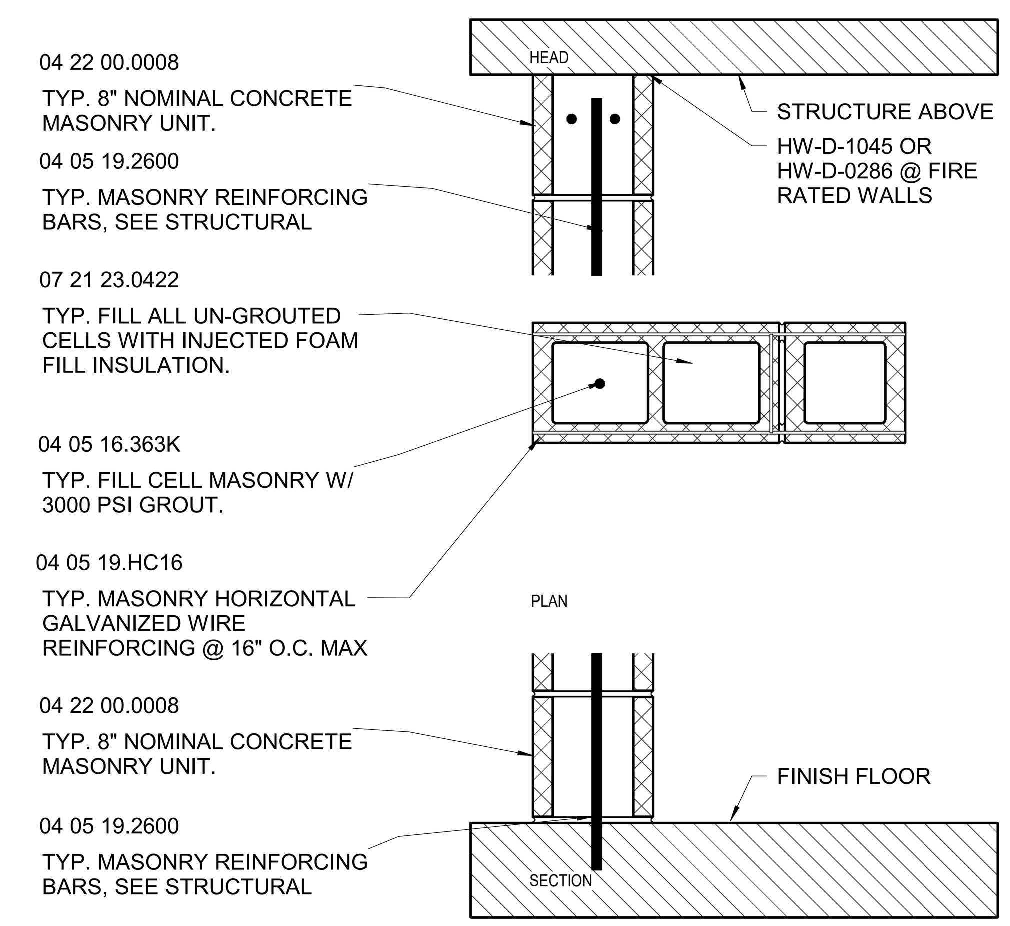
D3 [F1] WALL SYSTEM

1 1/2" = 1'-0"



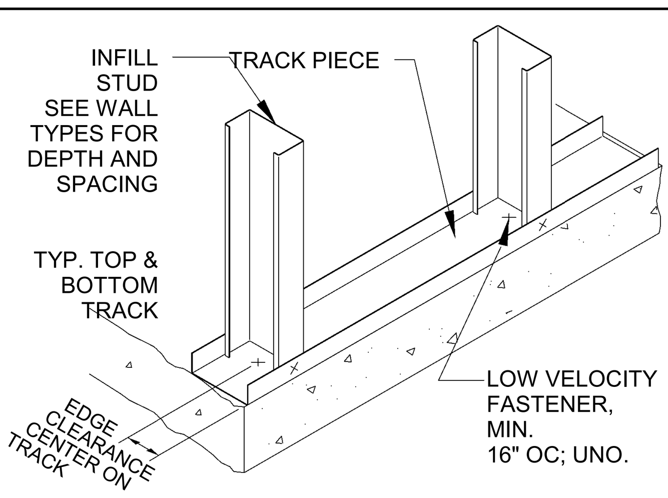
B2 [G2] WALL SYSTEM

1 1/2" = 1'-0"



B3 [M] WALL SYSTEM

1 1/2" = 1'-0"

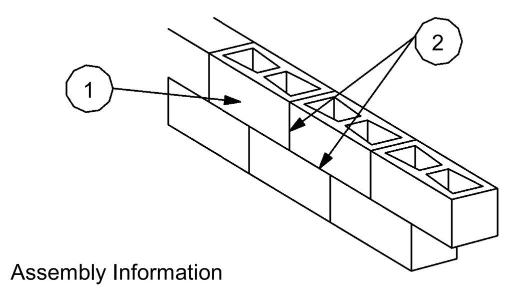


A2 TYP. FASTENER DETAIL

N.T.S.

BLOCK CALCULATIONS

WALL RATING - 1 HR.



Assembly Information

1. Preferred product 910635 c.m.u. 8" x 8" x 16" nominal
2. ASTM C-270 Masonry Mortar, Type M or S. Face Shell or full mortar bedding as required.
3. Masonry grout, reinforcing steel, joint reinforcement, anchors, ties and accessories (Not depicted above - optional). Use where specified.

Preferred Materials Inc. accepts no responsibility for proper application of the rated wall assembly above, or responsibility for the construction of such assemblies.

Concrete Masonry Unit

§721.3.2 of the Florida Building Code

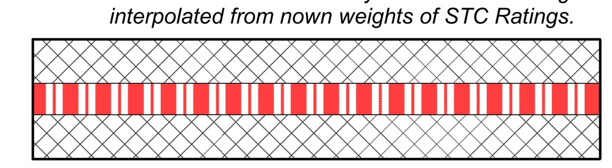
Unit Description:	**910635**
Size W x H x L Nominal:	**8 x 8 x 16**
Equivalent Thickness Inches:	**3.6**
Fire Rating Minutes:	**95.5***

* *Linear interpolation from table 721.3.2 of the Florida Building Code for Exposed Finish Block Mix -- 55% Limestone & 45% Siliceous Aggregates.*

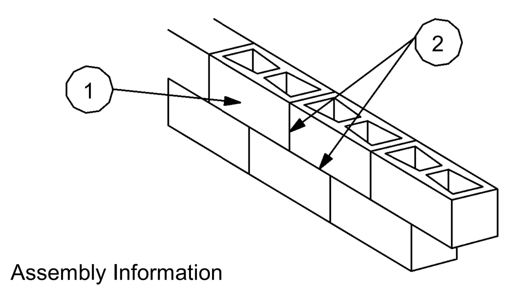
Acoustical Properties

Unit Description:	**910635**
Unit Weight in Pounds (lbs.):	**32**
lbs./SF:	**36.08**
STC Rating:	**47.8****

** *STC Rating based on minimum lbs./SF required to archive Sound Transmission Class as Defined by the National Concrete Masonry Association. Rating Value interpolated from nown weights of STC Ratings.*



WALL RATING - 2 HR.



Assembly Information

1. Preferred product 910505 c.m.u. 8" x 8" x 16" nominal
2. ASTM C-270 Masonry Mortar, Type M or S. Face Shell or full mortar bedding as required.
3. Masonry grout, reinforcing steel, joint reinforcement, anchors, ties and accessories (Not depicted above - optional). Use where specified.

Preferred Materials Inc. accepts no responsibility for proper application of the rated wall assembly above, or responsibility for the construction of such assemblies.

Concrete Masonry Unit

§721.3.2 of the Florida Building Code

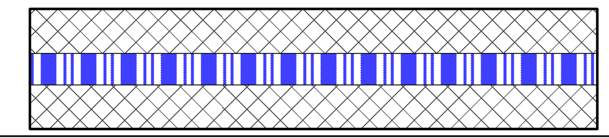
Unit Description:	**910505**
Size W x H x L Nominal:	**8 x 8 x 16**
Equivalent Thickness Inches:	**4.1**
Fire Rating Minutes:	**120.5***

* *Linear interpolation from table 721.3.2 of the Florida Building Code for Exposed Finish Block Mix -- 55% Limestone & 45% Siliceous Aggregates.*

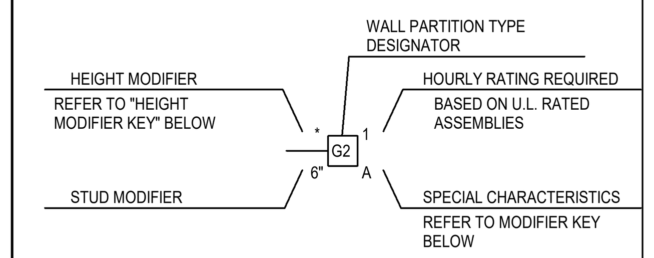
Acoustical Properties

Unit Description:	**910505**
Unit Weight in Pounds (lbs.):	**38**
lbs./SF:	**42.84**
STC Rating:	**49.8****

** *STC Rating based on minimum lbs./SF required to archive Sound Transmission Class as Defined by the National Concrete Masonry Association. Rating Value interpolated from nown weights of STC Ratings.*



PARTITION MARK



WALL PARTITION TYPES

B = BURNISHED (NCA TYPE GRF) ARCHITECTURAL MASONRY UNIT

F# = GYP BD ON FURRING (# DESIGNATES TOTAL LAYERS OF GYP BD)

G# = GYP BD ON METAL STUDS (# DESIGNATES TOTAL LAYERS OF GYP BD)

M = CONCRETE MASONRY UNIT

P = PROJECTILE RESISTANT PARTITIONS

S = GYPSUM BOARD SHAFT WALL

V = "BURNISHED" GROUND FACE ARCHITECTRUAL CMU - "GRF" CMA DESIGNATION

Z = GYPSUM BOARD ON METAL ZEE FURRING

HEIGHT MODIFIER KEY

(NO MODIFIER) = EXTEND ENTIRE WALL ASSEMBLY FROM FLOOR SLAB TO STRUCTURAL DECK ABOVE

P = EXTEND ENTIRE WALL ASSEMBLY FROM FINISH FLOOR TO 5'-8" ABOVE FINISH FLOOR ELEVATION ("HOLDROOM")

Q = EXTEND ENTIRE WALL ASSEMBLY FROM FINISH FLOOR TO 7'-0" ABOVE FINISH FLOOR ELEVATION ("HOLDROOM")

R = EXTEND ENTIRE WALL ASSEMBLY FROM FINISH FLOOR TO 8'-2" ABOVE FINISH FLOOR ELEVATION ("HOLDROOM")

V = EXTEND ENTIRE WALL ASSEMBLY FROM **12'-0"** ABOVE FINISH FLOOR TO STRUCTURAL DECK ABOVE (BRACE AS REQUIRED)

W = EXTEND ENTIRE WALL ASSEMBLY FROM FLOOR SLAB TO **12'-0"** ABOVE FINISH FLOOR (BRACE AS REQUIRED)

X = EXTEND ENTIRE WALL ASSEMBLY FROM FLOOR SLAB TO **6"** ABOVE FINISH CEILING (BRACE AS REQUIRED)

Y = EXTEND STRUCTURE TO DECK ABOVE HOLD STUD AND GWB TO **3'-0"** ABOVE FINISH CEILING (BRACE AS REQUIRED)

Z = EXTEND ENTIRE WALL ASSEMBLY FROM FLOOR SLAB TO **1' - 4"** ABOVE FINISH CEILING (BRACE AS REQUIRED)

FIRE RATING MODIFIER KEY

(NO MODIFIER) = NO FIRE RATING

1, 2, 3, ETC. = PARTITION FIRE RATING (IN HOURS)

WALL DEPTH MODIFIER KEY

CAST IN PLACE CONCRETE:
CONCRETE MASONRY UNIT:
NO MODIFIER = 8" CMU
4, 6, 8,12 = CMU DEPTH (NOMINAL DIMENSION IN INCHES)

METAL STUDS:
NO MODIFIER = 3 5/8"
1.6 = 1- 5/8", 2.5 = 2-1/2", 4 = 4", 6 = 6", 8 = 8"

SHAFT WALL STUDS:
NO MODIFIER = 4"
2.5 = 2-1/2"

SPECIAL CHARACTERISTIC MODIFIER KEY

(NO MODIFIER) = NO SPECIAL CHARACTERISTIC

A = ACOUSTICAL

L = LEAD-SHIELDED

M = ABUSE-RESISTANT GYPSUM BOARD ONE-SIDE TO 8' - 0" AFF UNO

N = ABUSE-RESISTANT GYPSUM BOARD EACH SIDE TO 8' - 0" AFF UNO

P = PROJECTILE RESISTANT

R = SECURITY FENCING EXTENDING FROM ACCESS FLOOR TO FLOOR SLAB BELOW & FROM ABOVE CEILING TO STRUCTURAL DECK ABOVE

S = SECURITY FENCING ABOVE PARTITION TO STRUCTURAL DECK ABOVE

T = THERMALLY INSULATED

U = SPILL CONTAINMENT CURB

V = SECURITY FENCING EXTENDING FROM ACCESS FLOOR TO FLOOR SLAB BELOW

PARTITION TYPE NOTES

1. ALL INTERIOR STUDS SHALL WITHSTAND A LATERAL LOAD OF NOT LESS THAN 5 LBS/FT ². DEPTH OF STUDS OR WIDTH OF MASONRY SHALL NOT BE INCREASED OR DECREASED FROM THAT SHOWN ON THE DRAWINGS. IN ORDER TO ACCOMMODATE THE REQUIRED LATERAL LOAD FOR LONG SPAN PARTITIONS THAT DO NOT EXTEND TO STRUCTURE ABOVE, THE CONTRACTOR MAY MODIFY THE PARTITION USING ANY, OR ANY COMBINATION, OF THE FOLLOWING METHODS:

A. BRACE STUDS DIAGONALLY TO STRUCTURAL DECK ABOVE SUSPENDED CEILING:
B. INCREASE THICKNESS (GAGE) OF METAL STUDS;
C. PROVIDE ADDITIONAL REINFORCEMENT; AND/ OR
D. DECREASE SPACING OF METAL STUDS.

2. REFER TO FINISH SCHEDULE FOR WALL BASE, CERAMIC TILE, FRP OR ANY OTHER FINISH TO BE APPLIED TO WALL SURFACE.

LIFE SAFETY LEGEND

RATED FIRE PARTITIONS
1 = 1 HOUR FIRE PARTITION
2 = 2 HOUR FIRE PARTITION

SCALE: 1 1/2" = 1'-0"

C19-2811- AP Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
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AA-C002208
MLM JOB #: TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	**MLM-19672**
Designed By:	**MLM, MAM**
Drawn By:	**ST, CC, DM, CB**
Checked By:	**MAM**
Issue Date:	**30-NOV-2020**
Drawing Scale:	**AS NOTED**

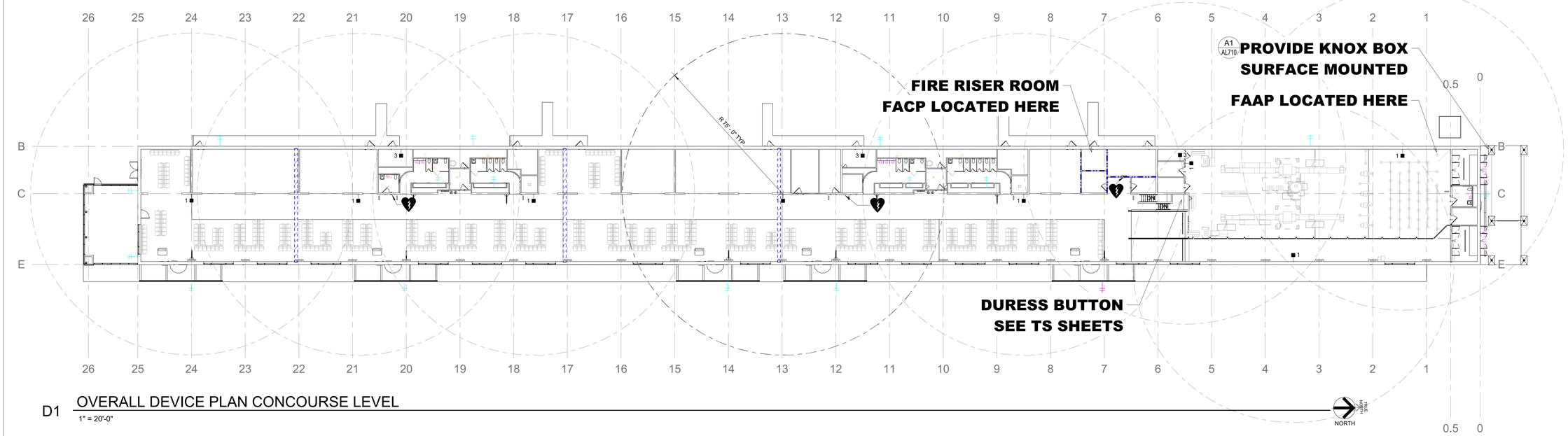
Drawing Title:

INTERIOR PARTITION TYPES

BID DOCUMENTS

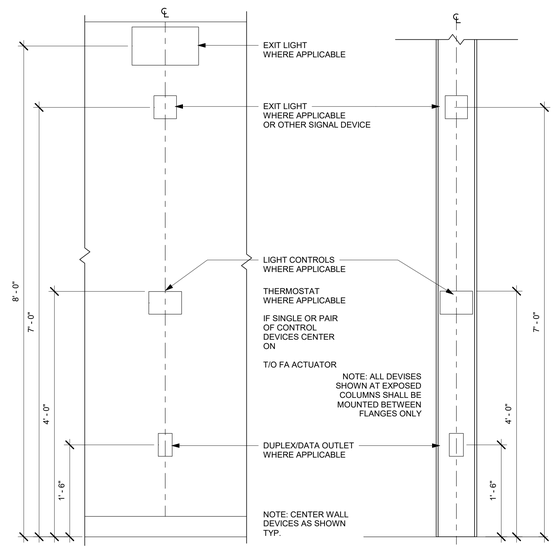
Drawing No.:

AL641



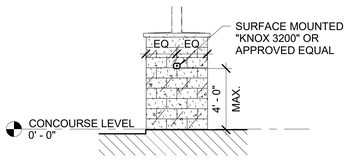
D1 OVERALL DEVICE PLAN CONCOURSE LEVEL

1" = 20'-0"



B5 WALL DEVICES

N.T.S.



A1 LOCK BOX LOCATION

1/4" = 1'-0"

FAS SYMBOLS

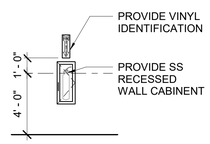
- MANUAL PULL STATION SEE FA SHEETS
- AUDIO/VISUAL DEVICE SEE FA SHEETS
- AED CABINENT, SEE SPECIFICATIONS

EXTINGUISHER NOTES

FIRE EXTINGUISHERS SHALL BE PROVIDED THROUGHOUT IN ACCORDANCE WITH NFPA 10, NFPA 1, FFPC SIXTH EDITION, AS FOLLOWS:

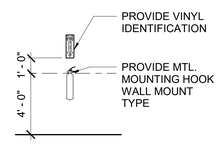
A. FIRE EXTINGUISHERS SHALL NOT BE OBSTRUCTED OR OBSCURED FROM VIEW.
B. FIRE EXTINGUISHERS (40 LB. OR LESS) SHALL BE INSTALLED SO THAT THE TOP OF THE FIRE EXTINGUISHER IS NOT MORE THAN 5 FT. ABOVE THE FLOOR.
C. EXTINGUISHER'S OPERATING INSTRUCTIONS SHALL BE LOCATED ON THE FRONT OF THE EXTINGUISHER AND SHALL BE CLEARLY VISIBLE.
D. FIRE EXTINGUISHERS LOCATED IN CABINETS OR WALL RECESSES MUST BE PLACED WITH THE EXTINGUISHER OPERATING INSTRUCTIONS FACING OUTWARD.
E. MAXIMUM TRAVEL DISTANCE TO ANY EXTINGUISHER SHALL BE 75 FEET, FOR CLASS A HAZARD AREAS.

EXTINGUISHER TYPE



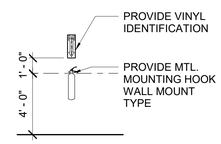
TYPE 1 ■1

MULTIPURPOSE DRY-CHEMICAL TYPE: UL RATED 4-A 80-B:C, 10 LB NOMINAL CAPACITY, IN ENAMILED STEEL CONTAINER. RECESSED CAB.



TYPE 2 ■2

MULTIPURPOSE DRY-CHEMICAL TYPE: UL RATED 4-A 80-B:C, 10 LB NOMINAL CAPACITY, IN ENAMILED STEEL CONTAINER.



TYPE 3 ■3

REGULAR DRY-CHEMICAL TYPE: UL RATED 60-B:C, 10LB NOMINAL CAPACITY, IN ENAMELED-STEEL CONTAINER.

SCALE: 1/4" = 1'-0"

0 1' 2' 4' 8'

SCALE: 1" = 20'-0"

0 5' 10' 20' 40'

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction
of Satellite
Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
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ALM 508 & 5 TYPE PROPERTY
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SEAL

Revisions

No.	Date	Description

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Designed By:	MLM, MAM
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Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	AS NOTED

Drawing Title:

FIRE DEVICE PLAN & LEGEND

BID DOCUMENTS

Drawing No.:

AL710

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

12/8/2020 5:55:14 PM

BXUV - Fire Resistance Ratings - ANSI/UL 263

BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263

See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

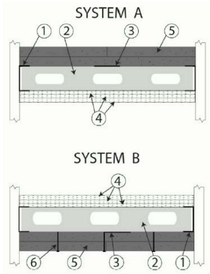
Design No. I502

September 19, 2017

Unrestrained Assembly Rating - 2 Hr

Load Restriction - Limited to the Dead Weight of the Assembly.

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**



1. **Perimeter Channels —** Used to support steel studs at both ends of wall structure. Min. 6 in. deep with min. 2 in. legs and formed from min. No. 20 MSG galv. steel (0.0329 in. thick bare metal thickness). Perimeter channels attached to wall structure with fasteners spaced not greater than 24 in. O.C. at both the top and bottom of the vertical leg. Maximum clear span from vertical leg to vertical leg of the perimeter channels is 8 ft., 2-1/4 in.

2. **Steel Studs —** Min. 6 in. wide with min. 1-5/8 in. legs containing folded back flanges and formed from min. No. 20 MSG galv. steel (0.0329 in. thick bare metal thickness) . Studs to be cut 1/2 in. to 3/4 in. less than the clear span between the vertical legs of the perimeter channels. Studs spaced a max. 16 in. O.C. At each end of the stud, the un-faced side shall be secured to the perimeter channel with one 1/2 in. long pan-head steel screw. Studs are used at each end of the horizontal barrier to terminate the assembly at the adjoining wall. These end studs shall be secured to the adjoining wall in the same manner as the perimeter channels (Item1).

3. **Steel Strap —** Min 4 in. wide formed from min. No. 20 MSG galv. steel (0.0329 in. thick bare metal thickness). Secured perpendicular to the studs at the centerline of the span using two 1/2 in. long pan-head steel screws. Strips to overlap one full stud bay at splice locations.

4. **Gypsum Board* —** Three layers of nom. 5/8 in. thick, 46 to 54 in. wide, gypsum board installed with long dimension perpendicular to the steel studs. Base layer installed with end joints in adjacent rows staggered min. 32 in. Boards secured to studs and perimeter channels with 1-1/4 in. long Type S steel screws spaced max. 16 in. O.C. Middle layer installed with end joints in adjacent rows staggered min. 32 in. Boards secured to the studs and perimeter channels with 1-5/8 in. long Type S steel screws spaced max. 16 in. O.C. Middle layer joints staggered a min. 16 in. from base layer joints Face layer installed with end joints in adjacent rows staggered min. 32 in. Boards secured to the studs and perimeter channels with 2-1/4 in. long Type S steel screws spaced max. 12 in. O.C. Face layer joints staggered a min. 16 in. from middle layer joints.
AMERICAN GYPSUM CO — Types AGX-1, AG-C, LightRoc.

5. **Batts and Blankets* —** Two layers of nom. 1-1/2 in. thick mineral wool batts.

SYSTEM A

Mineral wool batts are loosely laid perpendicular to the top side of the steel stud flanges. Base layer laid with narrow (2ft.) end joints centered over studs. Short end joints in adjacent rows are not staggered. Face layer laid with narrow (2ft.) end joints centered over studs with end joints in adjacent rows not being staggered. Narrow end joints between layers are staggered 16 in., with long end joints staggered 8 in. between layers.

SYSTEM B

Mineral wool batts are attached mechanically perpendicular to the steel stud flanges. Base layer attached with narrow (2ft.) end joints centered over studs. Short end joints in adjacent rows are not staggered. Face layer attached with narrow (2ft.) end joints centered over studs with end joints in adjacent rows not being staggered. Narrow end joints between layers are staggered 16 in., with long end joints staggered 8 in. between layers.

UNITED STATES MINERAL PRODUCTS CO, DBA ISOLATEK INTERNATIONAL — Type CB

6. **Pins and Clinch Shields —** Steel pins, 1/8 in. diameter steel wire studs, 4 in. long. Clinch Shields, 2-1/2 in. square, fabricated from min. 30 ga. galvanized steel.

SYSTEM A

Pins and clinch shields are not required.

SYSTEM B

Steel pins welded to the flanges of the steel studs, spaced 8 in. OC which results in a pin to be located at each intersection of narrow (2 ft.) end and long end joints of the face layer batt and blanket material. While impaling the base layer of batts on the pins, standard office rubber bands (or any other method) can be used to hold the batts in place until the face layer along with clinch shields are installed. One clinch shield installed on each steel pin.

7. **Adhesive* —** (Optional- Not Required, Not Shown) — May be applied to the joints prior to installation of the batts.
ISOLATEK INTERNATIONAL — Type CBA

8. **Joint Tape and Compound —** (Optional- Not Required, Not Shown) - Vinyl, dry or premixed joint compound, applied in two coats to joints and screw heads; paper tape, nom. 2 in. wide, embedded in first layer of compound over all joints.

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2017-09-19

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- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
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ASSEMBLY INDEX

I502 2hr UNRESTRAINED ASSEMBLY

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction
of Satellite
Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
SUITE 107
MAITLAND, FL 32751
407.897.6764 (VOICE)
407.894.1338 (FAX)
WWW.MLM-MARTIN.COM
AA-C002208
ALM 300 F-TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	**MLM-19672**
Designed By:	**MLM, MAM**
Drawn By:	**ST, CC, DM, CB**
Checked By:	**MAM**
Issue Date:	**30-NOV-2020**
Drawing Scale:	**NO SCALE**

Drawing Title:

CEILING
ASSEMBLY
LISTING

BID DOCUMENTS

Drawing No.:

AL831

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt
12/8/2020 5:55:24 PM

Design No. U415
BXUV.U415
Fire Resistance Ratings - ANSI/UL 263

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BXUV - Fire Resistance Ratings - ANSI/UL 263

BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263

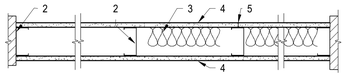
See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

Design No. U415

March 16, 2015

Nonbearing Wall Ratings — 1, 2, 3 or 4 Hr

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**



1. **Floor, Side and Ceiling Runners** — "J" - shaped runner, min 2-1/2 in. deep (min 4 in. deep when System C is used), with unequal legs of 1 in. and 2 in., fabricated from min 24 MSG (min 20 MSG when Item 4A, 4B or 7 are used) galv steel. Runners positioned with short leg toward finished side of wall. Runners attached to structural supports with steel fasteners located not greater than 2 in. from ends and not greater than 24 in. OC. "E" - shaped studs (Item 2A) may be used as side runners in place of "J" - shaped runners.

2. **Steel Studs** — "C-H" - shaped studs, min 2-1/2 in. deep (min 4 in. deep when System C is used), fabricated from min 25 MSG (min 20 MSG when Items 2D, 4A, 4B or 7 is used) galv steel. Cut to lengths 3/8 to 1/2 in. less than floor-to-ceiling height and spaced 24 in. or 600 mm OC.

2A. **Steel Studs** — (Not Shown) — "E" - shaped studs installed back to back in place of "C-H" - shaped studs (Item 2) "E" - shaped studs secured together with steel screws spaced a maximum 12 in. OC. Fabricated from min 25 MSG (min 20 MSG when Item 2D, 4A, 4B or 7 is used) galv steel, min 2-1/2 in. deep (min 4 in. deep when System C is used), with one leg 1 in. long and two legs 3/4 in. long. Shorter legs 1 in. apart to engage gypsum liner panels. Cut to lengths 3/8 to 1/2 in. less than floor to ceiling heights.

2B. **Furring Channels** — (Optional, not shown) — For use with single or double layer systems. Resilient furring channels fabricated from min 25MSG corrosion protected steel, installed horizontally, and spaced vertically a max 24 in. OC. Flange portion of channel attached to each intersecting "C-H" or "E" stud on side of stud opposite the 1 in. liner panels with 1/2 in. long Type S or S-12 pan-head steel screws. When furring channels are used, wallboard to be installed vertically only. Not to be used with Type FRX-G gypsum wallboard, Type RB-LBG (Item 4A), Type Nelco (Item 4B) or cementitious backer units (Item 7).

2C. **Furring Channels** — For use with System I - "Hat" - shaped, 25 MSG galv steel furring channels attached directly over the inner layers of wallboard to each stud with 2 in. long Type S pan head steel screws. Screws alternate from top flange to bottom flange at each stud intersection. Furring channels spaced vertically max 24 in. OC.

2D. **Steel Framing Members*** — (Optional, not shown) — For use with single or double layer systems. Furring channels and Steel Framing Members as described below. Not to be used with Type FRX-G gypsum wallboard, Type RB-LBG (Item 4A), Type Nelco (Item 4B) or cementitious backer units (Item 7):

a. **Furring Channels** — Formed of No. 25 MSG galv steel. 2-9/16 in. or 2-23/32 in. wide by 7/8 in. deep, spaced max. 24 in. OC perpendicular to studs. Channels secured to studs as described in Item b. Gypsum board installed vertically only and attached to furring channels as described in Item 3.

b. **Steel Framing Members*** — Used to attach furring channels (Item 2Da) to studs (Item 2 or 2A). Clips spaced max. 24 in. OC., and secured to studs with No. 8 x 1-1/2 in. minimum self-drilling, S-12 steel screw through the center grommet. Furring channels are friction fitted into clips. RSIC-1 clip for use with 2-9/16 in. wide furring channels. RSIC-1 (2.75) clip for use with 2-23/32 in. wide furring channels.

PAC INTERNATIONAL INC — Types RSIC-1, RSIC-1 (2.75)

2E. **Steel Framing Members** — (Optional, Not Shown)* - Furring channels and resilient sound isolation clip as described below:

a. **Furring Channels** — Formed of No. 25 MSG galv steel. Spaced 24 in. OC perpendicular to studs. Channels secured to studs as described in Item b. Ends of adjoining channels overlapped 6 in. and secured together with four self-tapping No. 8x1/2 Self Drilling screws (2 per side 1 in. and 4 in. from overlap edge). Gypsum board attached to furring channels as described in Item 3. Side joint furring channels shall be attached to studs with RESILMOUNT Sound Isolation Clips - Type A237R located approximately 2 in. from each end of length of channel. Both Gypsum Boards at side joints fastened into channel with screws spaced 8 in. OC, approximately 1/2 in. from joint edge.

b. **Steel Framing Members*** — Resilient sound isolation clip used to attach furring channels (Item 2Ea) to studs. Clips spaced 24 in. OC., and secured to studs with No. 10 x 2-1/2 in. coarse drywall screw through the center hole. Furring channels are friction fitted into clips.

STUDCO BUILDING SYSTEMS — RESILMOUNT Sound Isolation Clips - Type A237R

2F. **Steel Framing Members*** — (Optional, not shown) — For use with single or double layer systems. Furring channels and Steel Framing Members as described below. Not to be used with Type FRX-G gypsum wallboard, Type RB-LBG (Item 4A), Type Nelco (Item 4B) or cementitious backer units (Item 7):

a. **Furring Channels** — Formed of No. 25 MSG galv steel. 2-3/8 in. wide by 7/8 in. deep, spaced max. 24 in. OC perpendicular to studs. Channels secured to studs as described in Item b. Gypsum board installed vertically only and attached to furring channels as described in Item 3.

b. **Steel Framing Members*** — Used to attach furring channels (Item 2Da) to studs (Item 2 or 2A). Clips spaced max. 24 in. OC. GENIECLIPS secured to studs with No. 8 x 1-1/2 in. minimum self-drilling, S-12 steel screw through the center grommet. Furring channels are friction fitted into clips.

PLITEQ INC — Type GENIECLIP

3. **Gypsum Board*** — Gypsum liner panels, nom 1 in. thick, 24 in. or 600 mm (for metric spacing) wide. Panels cut 1 in. less in length than floor to ceiling height. Vertical edges inserted in "H" portion of "C-H" studs or the gap between the two 3/4 in. legs of the "E" studs. Free edge of end panels attached to long leg of vertical "J" - runners with 1-5/8 in. long Type S steel screws spaced not greater than 12 in. OC. When wall height exceeds liner panel length, liner panel may be butted to extend to the full height of the wall. Horizontal joints need not be backed by steel framing. In System I, butt joints in liner panels are staggered min 36 in. Butt joints backed with 6 in. by 22 in. strips of 3/4 in. thick gypsum wallboard (Item 4). Wallboard strips centered over butt joints and secured to liner panels with six 1-1/2 in. long Type G steel screws, three screws along the 22 in. dimension at the top and bottom of the strips.

System A — 1 Hr

Gypsum panels with beveled, square or tapered edges, nom 5/8 in. thick, 48 in. or 1200 mm wide, applied vertically or horizontally. Inner and outer layers attached to studs with 1-5/8 in. long Type S steel screws spaced 12 in. when installed vertically or 8 in OC when installed horizontally. Horizontal joints need not be backed by steel framing.

CGC INC — Types SLX

USG MEXICO S A DE C V — Types SLX

CGC INC — Types AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, ULX, WRC, WRX

UNITED STATES GYPSUM CO — Types AR, C, FRX-G, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SGX, SHX, ULX, WRC, WRX, USGX

USG MEXICO S A DE C V — Types AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, ULX, WRC, WRX

System B — 2 Hr

Gypsum panels, with beveled, square or tapered edges, nom 1/2 in. or 5/8 in. thick, 48 in. or 1200 mm wide, applied vertically or horizontally in two layers. Inner or base layer attached to studs with 1 in. long Type S steel screws spaced 24 in. OC when installed vertically or 16 in. OC when installed horizontally. Outer or face layer attached to studs with 1-5/8 in. long Type S steel screws spaced 12 in. OC when installed vertically and staggered 12 in. from base layer screws or 8 in. OC when installed horizontally and staggered 8 in. from base layer screws. Horizontal joints between inner and outer layers staggered a min of 12 in. Horizontal joints need not be backed by steel framing. Vertical joints centered over studs and staggered 24 in.

CGC INC — 1/2 in. Type C, IP-X2, IPC-AR or WRC; 5/8 in. Types AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, ULX, WRC, WRX

UNITED STATES GYPSUM CO — 1/2 in. Types C, IP-X2, IPC-AR, or WRC; 5/8 in. Types AR, C, FRX-G, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SGX, SHX, ULX, USGX, WRC, WRX

USG MEXICO S A DE C V — 1/2 in. Types C, IP-X2, IPC-AR or WRC; 5/8 in. Types AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, ULX, WRC, WRX4A. **Gypsum Board*** — (As an alternate to Item 4 Systems A, B, C, D, E, G, H, and I when used as the base layer, For direct attachment only) - Nom 5/8 in. or ¼ in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over 20 MSG steel studs and staggered min 1 stud cavity on opposite sides of studs. See Items 1, 2, 2A, 2B and 2D. Wallboard secured to studs with 1-1/4 in. long Type S-12 steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field. For Joint Compound see Item 5. To be used with Lead Batten Strips (see Item 9) or Lead Discs or Tabs (see Item 10).

RAY-BAR ENGINEERING CORP — Type RB-LBG

4B. **Gypsum Board*** — (As an alternate to Item 4 Systems A, B, C, D, E, G, H, and I when used as the base layer, For direct attachment only) - Nominal 5/8 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over studs and staggered min 1 stud cavity on opposite sides of studs. Wallboard secured to studs with 1-1/4 in. long Type S-12 (or #6 by 1-1/4 in. long bugle head fine driller) steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field.

NEW ENGLAND LEAD BURNING CO INC, DBA NELCO — Type Nelco

4C. **Gypsum Board*** — (As an alternate to Item 4 Systems A, B, C, D, E, G, H, and I when used as the base layer, For direct attachment only) - Nom 5/8 or 3/4 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over 20 MSG steel studs and staggered min 1 stud cavity on opposite sides of studs. See Items 1, 2, 2A, 2B and 2D. Wallboard secured to studs with 1-1/4 in. long Type S-12 steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field. For Joint Compound see Item 5. To be used with Lead Batten Strips (see Item 9A) or Lead Discs (see Item 10A). Lead batten strips required behind vertical joints of lead backed gypsum wallboard and optional at remaining stud locations. Lead batten strips, min 2 in. wide, max 10 ft long with a max thickness of 0.140 in. placed on the face of studs and attached to the stud with two 1 in. long Type S-8 pan head steel screws, one at the top of the strip and one at the bottom of the strip.

MAYCO INDUSTRIES INC — Type X-Ray Shielded Gypsum

4D. **Gypsum Board*** — (As an alternate to Item 4 Systems A, B, C, D, E, G, H, and I when used as the base layer, For direct attachment only). Nom 5/8 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over studs and staggered min 1 stud cavity on opposite sides of studs. Wallboard secured to studs with 1-1/4 in. long Type S-12 steel screws gypsum panel steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field. Lead batten strips required behind vertical joints of lead backed gypsum wallboard and optional at remaining stud locations. Lead batten strips, min 2 in. wide, max 8 ft long with a max thickness of 0.14 in. placed on the face of studs and attached to the stud with construction adhesive and two 1 in. long Type S-12 pan head steel screws, one at the top of the strip and one at the bottom of the strip. Lead discs, nominal 3/8 in. diam by max 0.085 in. thick. Compression fitted or adhered over the screw heads. Lead batten strips and discs to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C".

RADIATION PROTECTION PRODUCTS INC — Type RPP - Lead Lined Drywall

5. **Joint Tape and Compound** — (Not Shown)

Systems A, B, C, E, F, G, H, I

Joints on outer layers of gypsum boards (Item 4 and 4A) covered with paper tape and joint compound. Paper tape and joint compound may be omitted when gypsum boards are supplied with square edges. Exposed screw heads covered with joint compound.

6. **Batts and Blankets*** —

Systems A, B, E, F, G, H, I

(Optional) — Mineral wool or glass fiber batts partially or completely filling stud cavity. Any mineral wool or glass fiber batt mineral bearing the UL Classification Marking as to Fire Resistance.

7. **Cementitious Backer Units*** — (System D) — Nom 1/2 or 5/8 in. thick panels, square edge, attached to studs over gypsum wallboard with 1-5/8 in. long, Type S-12, corrosion resistant steel screws spaced 8 in. OC and staggered 8 in. from gypsum wall board screws. Joints covered with glass fiber mesh tape. Vertical joints staggered one stud cavity from gypsum wallboard joints. Horizontal joints staggered a min of 12 in. from the gypsum wallboard joints.

UNITED STATES GYPSUM CO — Type DCB

8. **Laminating Adhesive*** — (Optional, Not Shown) — Used to bond outer layer of Cementitious Backer Units (Item 7) to inner layers of Gypsum Board (Item 4) in System D. ANSI A136.1 Type 1 organic adhesive applied with 1/4 in. square notched trowel. See Adhesives (BYWR) in the Fire Resistance Directory or Adhesives (BJLZ) in the Building Materials Directory for names of Classified companies.

9. **Lead Batten Strips** — (Not Shown, For Use With Item 4A) - Lead batten strips, min 1-1/2 in. wide, max 10 ft long with a max thickness of 0.125 in. Strips placed on the interior face of studs and attached from the exterior face of the stud with two 1 in. long Type S-12 pan head steel screws, one at the top of the strip and one at the bottom of the strip. Lead batten strips to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C". Lead batten strips required behind vertical joints of lead backed gypsum wallboard (Item 4A) and optional at remaining stud locations. Required behind vertical joints.

9A. **Lead Batten Strips** — (Not Shown, for use with Item 4C) Lead batten strips, 2 in. wide, max 10 ft long with a max thickness of 0.140 in. Strips placed on the face of studs and attached to the stud with two min. 1 in. long min. Type S-8 pan head steel screws, one at the top of the strip and one at the bottom of the strip or with one min. 1 in. long min. Type S-8 pan head steel screw at the top of the strip. Lead batten strips to have a purity of 99.5% meeting the Federal specification QQ-L-201f, Grades "B, C or D". Lead batten strips required behind vertical joints of lead backed gypsum wallboard (Item 6) and optional at remaining stud locations.

10. **Lead Discs or Tabs** — (Not Shown, For Use With Item 4A) - Used in lieu of or in addition to the lead batten strips (Item 9) or optional at other locations - Max 3/4 in. diam by max 0.125 in. thick lead discs compression fitted or adhered over steel screw heads or max 1/2 in. by 1-1/4 in. by max 0.125 in. thick lead tabs placed on gypsum boards (Item 4A) underneath screw locations prior to the installation of the screws. Lead discs or tabs to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C".

10A. **Lead Discs** — (Not Shown, for use with Item 4C) Max 5/16 in. diam by max 0.140 in. thick lead discs compression fitted or adhered over steel screw heads. Lead discs to have a purity of 99.5% meeting the Federal Specification QQ-L-201f, Grades "B, C or D".

11. **Lead Batten Strips** — (Not Shown, For Use With Item 4B) Lead batten strips, 2 in. wide, max 10 ft long with a max thickness of 0.142 in. Strips placed on the face of studs and attached to the stud with two min. 1 in. long min. Type S-8 pan head steel screws, one at the top of the strip and one at the bottom of the strip or with one min. 1 in. long min. Type S-8 pan head steel screw at the top of the strip. Lead batten strips to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C". Lead batten strips required behind vertical joints of lead backed gypsum wallboard (Item 4B) and optional at remaining stud locations.

12. **Lead Tabs** — (Not Shown, For Use With Item 4B) 2 in. wide, 5 in. long with a max thickness of 0.142 in. Tabs friction-fit around front face of stud, the stud folded back flange, and the back face of the stud. Tabs required at each location where a screw (that secures the gypsum boards, Item 4B) will penetrate the steel stud. Lead tabs to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C". Lead tabs may be held in place with standard adhesive tape if necessary.

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Last Updated on 2015-03-16

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Design No. U905
BXUV.U905
Fire Resistance Ratings - ANSI/UL 263

Design/System/Construction/Assembly Usage Disclaimer

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BXUV - Fire Resistance Ratings - ANSI/UL 263

BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263

See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

Design No. U905

March 11, 2016

Bearing Wall Rating — 2 HR.

Nonbearing Wall Rating — 2 HR.

This design was evaluated using a load design method other than the Limit States Design Method (e.g., Working Stress Design Method). For jurisdictions employing the Limit States Design Method, such as Canada, a load restriction factor shall be used — See Guide BXUV or BXUV7

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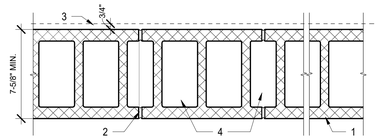

HORIZONTAL SECTION

1. **Concrete Blocks*** — Various designs. Classification D-2 (2 hr).

See **Concrete Blocks** category for list of eligible manufacturers.

2. **Mortar** — Blocks laid in full bed of mortar, nom. 3/8 in. thick, of not less than 2-1/4 and not more than 3-1/2 parts of clean sharp sand to 1 part Portland cement (proportioned by volume) and not more than 50 percent hydrated lime (by cement volume). Vertical joints staggered.

3. **Portland Cement Stucco or Gypsum Plaster** — Add 1/2 hr to classification if used. Where combustible members are framed in wall, plaster or stucco must be applied on the face opposite framing to achieve a max. Classification of 1-1/2 hr. Attached to concrete blocks (Item 1).

4. **Loose Masonry Fill** — If all core spaces are filled with loose dry expanded slag, expanded clay or shale (Rotary Kiln Process), water repellant vermiculite masonry fill insulation, or silicone treated perlite loose fill insulation add 2 hr to classification.

5. **Foamed Plastic*** — (Optional-Not Shown) — 1-1/2 in. thick max, 4 ft wide sheathing attached to concrete blocks (Item 1).

ATLAS ROOFING CORP — "EnergyShield Pro Wall Insulation" and "EnergyShield Pro 2 Wall Insulation"

CARLISLE COATINGS & WATERPROOFING INC — Type R2+ Sheath

FIRESTONE BUILDING PRODUCTS CO L L C — "Enverge™ CI Foil Exterior Wall Insulation" and "Enverge™ CI Glass Exterior Wall Insulation"

HUNTER PANELS — Types Xci-Class A, Xci 286

RMAX OPERATING L L C — "TSX-8500", "TSX-8510", "Thermasheath-XP", "ECOMAXci", "Thermasheath-3", "Durasheath-3"

THE DOW CHEMICAL CO — Types Thermax Sheathing, Thermax Light Duty Insulation, Thermax Heavy Duty Insulation, Thermax Metal Building Board, Thermax White Finish Insulation, Thermax ci Exterior Insulation, Thermax XARMOR ci Exterior Insulation, Thermax IH Insulation, Thermax Plus Liner Panel, Thermax Heavy Duty Plus (HDP) and TUFF-R™ ci Insulation

5A. **Building Units** — As an alternate to Items 5, min. 1-in thick polyisocyanurate composite foamed plastic insulation boards, nom. 48 by 48 or 96 in.

RMAX OPERATING L L C — "Thermasheath-SI", "ECOBASEci", "ThermaBase-CI"

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Last Updated on 2016-03-11

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ASSEMBLY INDEX

U905 2 hr BEARING CMU WALL

U415 1, 2, 3 OR 4 hr NONBEARING GWB WALL

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
SUITE 107
MAITLAND, FL 32751
407.897.6764 (VOICE)
407.894.1338 (FAX)
WWW.MLM-MARTIN.COM
AA-C002208
ALM SOR-F-TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	**MLM-19672**
Designed By:	**MLM, MAM**
Drawn By:	**ST, CC, DM, CB**
Checked By:	**MAM**
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Drawing Title:

WALL ASSEMBLY LISTING

BID DOCUMENTS

Drawing No.:

AL851

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

12/8/2020 5:55:30 PM

Design No. U419
BXUV.U419
Fire Resistance Ratings - ANSI/UL 263

Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

BXUV - Fire Resistance Ratings - ANSI/UL 263

BXUV7 - Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

See General Information for Fire-resistance Ratings - ANSI/UL 263

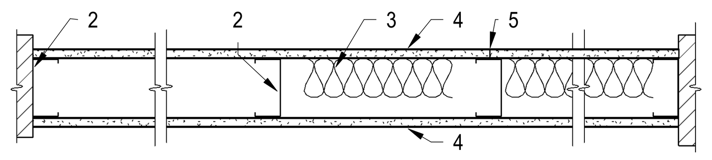
See General Information for Fire Resistance Ratings - CAN/ULC-S101 Certified for Canada

Design No. U419

February 25, 2015

Nonbearing Wall Ratings — 1, 2, 3 or 4 Hr (See Items 4 & 5)

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**



1. **Floor and Ceiling Runners** — (Not shown) — For use with Item 2 - Channel shaped, fabricated from min 25 MSG corrosion-protected steel, min depth to accommodate stud size, with min 1-1/4 in. long legs, attached to floor and ceiling with fasteners 24 in. OC max.

1A. **Framing Members*** - Floor and Ceiling Runner — Not shown - In lieu of Item 1 — For use with Item 2B, proprietary channel shaped runners, 3-5/8 in. deep attached to floor and ceiling with fasteners 24 in. OC max.

CALIFORNIA EXPANDED METAL PRODUCTS CO — Viper25™ Track

CRACO MFG INC — SmartTrack25™

MARINO/WARE, DIV OF WARE INDUSTRIES INC — Viper25™ Track

PHILLIPS MFG CO L L C — Viper25™ Track

1B. **Framing Members*** - Floor and Ceiling Runner — Not shown - In lieu of Item 1 — For use with Item 2C, proprietary channel shaped runners, 1-1/4 in. wide by 3-5/8 in. deep fabricated from min 0.020 in. thick galv steel, attached to floor and ceiling with fasteners spaced 24 in. OC max.

CALIFORNIA EXPANDED METAL PRODUCTS CO — Viper20™ Track

MARINO/WARE, DIV OF WARE INDUSTRIES INC — Viper20™ Track

PHILLIPS MFG CO L L C — Viper20™ Track

1C. **Framing Members***— Floor and Ceiling Runners — (Not shown) — In lieu of Item 1 - Channel shaped, attached to floor and ceiling with fasteners 24 in. OC. max.

ALLSTEEL & GYPSUM PRODUCTS INC — Type SUPREME Framing System

CONSOLIDATED FABRICATORS CORP, BUILDING PRODUCTS DIV — Type SUPREME Framing System

QUAIL RUN BUILDING MATERIALS INC — Type SUPREME Framing System

SCAFCO STEEL STUD MANUFACTURING CO — Type SUPREME Framing System

STEEL CONSTRUCTION SYSTEMS INC — Type SUPREME Framing System

UNITED METAL PRODUCTS INC — Type SUPREME Framing System

1D. **Floor and Ceiling Runners** — (Not shown)—For use with Item 2A- Channel shaped, fabricated from min 20 MSG corrosion-protected or galv steel, min depth to accommodate stud size, with min 1 in. long legs, attached to floor and ceiling with fasteners spaced max 24 in. OC.

1E. **Framing Members***— Floor and Ceiling Runners — (Not shown, As an alternate to Item 1) — For use with Items 2E, 5F or 5G or 5I only, channel shaped, fabricated from min. 0.015 in. (min bare metal thickness) galvanized steel, attached to floor and ceiling with fasteners 24 in. OC. max.

CLARKDIETRICH BUILDING SYSTEMS — CD ProTRAK

DMFCWBS L L C — ProTRAK

MBA METAL FRAMING — ProTRAK

RAM SALES L L C — Ram ProTRAK

STEEL STRUCTURAL SYSTEMS L L C — Tri-S ProTRAK

1F. **Framing Members*** - Floor and Ceiling Runner — Not shown - In lieu of Item 1 — For use with Item 2F, proprietary channel shaped runners, minimum width to accommodate stud size, with 1- 1/8 in. long legs fabricated from min 0.015 in. (min bare metal thickness) galv steel, attached to floor and ceiling with fasteners spaced 24 in. OC max.

SUPER STUD BUILDING PRODUCTS — The Edge

1G. **Framing Members*** - Floor and Ceiling Runner — For use with Item 2G, proprietary channel shaped runners, minimum width to accommodate stud size attached to floor and ceiling with fasteners 24 in. OC max.

STUDCO BUILDING SYSTEMS — CROCSTUD Track

1H. **Floor and Ceiling Runners** — (Not shown) — Channel shaped, fabricated from min 0.02 in. galv steel, min width to accommodate stud size, with min 1 in. long legs, for use with studs specified below and fabricated from min 0.02 in. galv steel or thicker, attached to floor and ceiling with fasteners spaced max 24 in. OC.

MARINO/WARE, DIV OF WARE INDUSTRIES INC — Viper20™ Track VT100.

1I. **Framing Members***— Floor and Ceiling Runners — (Not shown, As an alternate to Item 1) — For use with Items 2H, channel shaped, fabricated from min. 0.015 in. (min bare metal thickness) galvanized steel, attached to floor and ceiling with fasteners 24 in. OC. max.

TELLING INDUSTRIES L L C — TRUE-TRACK™

1J. **Framing Members*** - Floor and Ceiling Runner — Not shown - In lieu of Item 1 — For use with Item 2I, proprietary channel shaped runners, 3-5/8 in. deep attached to floor and ceiling with fasteners 24 in. OC max.

TELLING INDUSTRIES L L C — Viper25™ Track

1K. **Framing Members*** - Floor and Ceiling Runner — Not shown - In lieu of Item 1 — For use with Item 2J, proprietary channel shaped runners, 1-1/4 in. wide by 3-5/8 in. deep fabricated from min 0.020 in. thick galv steel, attached to floor and ceiling with fasteners spaced 24 in. OC max.

TELLING INDUSTRIES L L C — Viper20™ Track

2. **Steel Studs** — Channel shaped, fabricated from min 25 MSG corrosion-protected steel, min depth as indicated under Item 5, spaced a max of 24 in. OC. Studs to be cut 3/8 to 3/4 in. less than assembly height.

2A. **Steel Studs** — (As an alternate to Item 2, For use with Items 5B, 5E, 5H and 5J) Channel shaped, fabricated from min 20 MSG corrosion-protected or galv steel, 3-1/2 in. min depth, spaced a max of 16 in. OC. Studs friction-fit into floor and ceiling runners. Studs to be cut 5/8 to 3/4 in. less than assembly height.
2B. **Framing Members*** - Steel Studs — (As an alternate to Item 2, For use with Items 5C, 5I or 5K) - Proprietary channel shaped studs, 3-5/8 in. deep spaced a max of 24 in. OC. Studs to be cut 3/4 in less than the assembly height and installed with a 1/2 in. gap between the end of the stud and track at the bottom of the wall. For direct attachment of gypsum board only.

CALIFORNIA EXPANDED METAL PRODUCTS CO — Viper25™

CRACO MFG INC — SmartStud25™

MARINO/WARE, DIV OF WARE INDUSTRIES INC — Viper25™

PHILLIPS MFG CO L L C — Viper25™

2C. **Framing Members*** - Steel Studs — Not shown - In lieu of Item 2 — proprietary channel shaped steel studs, min depth as indicated under Item 5, spaced a max if 24 in. OC, fabricated from min 0.020 in. thick galv steel. Studs cut 3/8 in. to 3/4 in. less in lengths than assembly heights.

CALIFORNIA EXPANDED METAL PRODUCTS CO — Viper20™

MARINO/WARE, DIV OF WARE INDUSTRIES INC — Viper20™

PHILLIPS MFG CO L L C — Viper20™

2D. **Framing Members***— Steel Studs — In lieu of Item 2 - Channel shaped studs, min depth as indicated under Item 5, spaced a max of 24 in. OC. Studs to be cut 3/4 in. less than assembly height.

ALLSTEEL & GYPSUM PRODUCTS INC — Type SUPREME Framing System

CONSOLIDATED FABRICATORS CORP, BUILDING PRODUCTS DIV — Type SUPREME Framing System

QUAIL RUN BUILDING MATERIALS INC — Type SUPREME Framing System

SCAFCO STEEL STUD MANUFACTURING CO — Type SUPREME Framing System

STEEL CONSTRUCTION SYSTEMS INC — Type SUPREME Framing System

UNITED METAL PRODUCTS INC — Type SUPREME Framing System

2E. **Framing Members***— Steel Studs — (Not shown, As an alternate to Item 2) —For use with Items 5F or 5G or 5I only, channel shaped studs, min depth as indicated under Item 5F, 5G or 5I, fabricated from min. 0.015 in. (min bare metal thickness) galvanized steel, spaced a max of 24 in. OC. Studs to be cut 3/4 in. less than assembly height.

CLARKDIETRICH BUILDING SYSTEMS — CD ProSTUD

DMFCWBS L L C — ProSTUD

MBA METAL FRAMING — ProSTUD

RAM SALES L L C — Ram ProSTUD

STEEL STRUCTURAL SYSTEMS L L C — Tri-S ProSTUD

2F. **Framing Members*** - Steel Studs — Not shown - In lieu of Item 2 — proprietary channel shaped steel studs, minimum width indicated under Item 5, 1-1/4 in. deep fabricated from min 0.015 in. (min bare metal thickness) galvanized steel. Studs 3/8 in. to 3/4 in. less in lengths than assembly heights.

SUPER STUD BUILDING PRODUCTS — The Edge

2G. **Framing Members*** - Steel Studs — Not shown - In lieu of Item 2 - proprietary channel shaped studs, minimum width indicated under Item 5, Studs to be cut 3/8 to 3/4 in less than the assembly height.

STUDCO BUILDING SYSTEMS — CROCSTUD

2H. **Framing Members***— Steel Studs — (Not shown, As an alternate to Item 2) — Fabricated from min. 0.015 in. (min bare metal thickness) galvanized steel, spaced a max of 24 in. OC. Studs to be cut 3/4 in. less than assembly height.

TELLING INDUSTRIES L L C — TRUE-STUD™

2I. **Framing Members*** - Steel Studs — (As an alternate to Item 2, For use with Items 5C or 5L) - Proprietary channel shaped studs, 3-5/8 in. deep spaced a max of 24 in. OC. Studs to be cut 3/4 in less than the assembly height and installed with a ½ in. gap between the end of the stud and track at the bottom of the wall. For direct attachment of gypsum board only.

TELLING INDUSTRIES L L C — Viper25™

2J. **Framing Members*** - Metal Studs — Not shown - In lieu of Item 2 — proprietary channel shaped steel studs, min depth as indicated under Item 5, spaced a max if 24 in. OC, fabricated from min 0.020 in. thick galv steel. Studs cut 3/8 in. to 3/4 in. less in lengths than assembly heights

TELLING INDUSTRIES L L C — Viper20™

2K. **Framing Members***— Steel Studs — As an alternate to Item 2 - For use with Item 1, channel shaped studs, fabricated from min 25 MSG corrosion-protected steel, min depth as indicated under Item 5, spaced a max of 24 in. OC. Studs to be cut 3/8 to 3/4 in. less than assembly height.

EB MéTAL INC — EB Stud

2L. **Framing Members***— Steel Studs — As an alternate to Item 2 - For use with Item 1, channel shaped studs, fabricated from min 25 MSG corrosion-protected steel, min depth as indicated under Item 5, spaced a max of 24 in. OC. Studs to be cut 3/8 to 3/4 in. less than assembly height.

OLMAR SUPPLY INC — PRIMESTUD

3. **Wood Structural Panel Sheathing** — (Optional, For use with Item 5 Only.)- (Not Shown) - 4 ft wide, 7/16 in. thick oriented strand board (OSB) or 15/32 in. thick structural 1 sheathing (plywood) complying with DOC PS1 or PS2, or APA Standard PRP-108, manufactured with exterior glue, applied horizontally or vertically to the steel studs. Vertical joints centered on studs, and staggered one stud space from wallboard joints. Attached to studs with flat-head self-drilling tapping screws with a min. head diam. of 0.292 in. at maximum 6 in. OC. in the perimeter and 12 in. OC. in the field. When used, fastener lengths for gypsum panels increased by min. 1/2 in.

4. **Batts and Blankets*** — (Required as indicated under Item 5) — Mineral wool batts, friction fitted between studs and runners. Min nom thickness as indicated under Item 5. See Batts and Blankets (BKNV or BZJZ) Categories for names of Classified companies.

4A. **Batts and Blankets*** — (Optional) — Placed in stud cavities, any glass fiber or mineral wool insulation bearing the UL Classification Marking as to Surface Burning Characteristics and/or Fire Resistance. See Batts and Blankets (BKNV or BZJZ) Categories for names of Classified companies.

4B. **Batts and Blankets*** — Placed in stud cavities, any 3-1/2 in. thick glass fiber insulation bearing the UL Classification Marking as to Surface Burning Characteristics and/or Fire Resistance. See Batts and Blankets (BKNV or BZJZ) Categories for names of Classified companies.

5. **Gypsum Board*** — Gypsum panels with beveled, square or tapered edges, applied vertically or horizontally. Vertical joints centered over studs and staggered one stud cavity on opposite sides of studs. Vertical joints in adjacent layers (multilayer systems) staggered one stud cavity. Horizontal joints need not be backed by steel framing. Horizontal edge joints and horizontal butt joints on opposite sides of studs need not be staggered. Horizontal edge joints and horizontal butt joints in adjacent layers (multilayer systems) staggered a min of 12 in. The thickness and number of layers for the 1 hr, 2 hr, 3 hr and 4 hr ratings are as follows:

Gypsum Board Protection on Each Side of Wall

Rating, Hr	Min Stud Depth, in. Items 2, 2C, 2D, 2F and 2G	No. of Layers & Thkns of Panel	Min Thkns of Insulation (Item 4)
1	3-1/2	1 layer, 5/8 in. thick	Optional
1	2-1/2	1 layer, 1/2 in. thick	1-1/2 in.
1	1-5/8	1 layer, 3/4 in. thick	Optional
2	1-5/8	2 layers, 1/2 in. thick	Optional
2	1-5/8	2 layers, 5/8 in. thick	Optional
2	3-1/2	1 layer, 3/4 in. thick	3 in.
3	1-5/8	3 layers, 1/2 in. thick	Optional
3	1-5/8	2 layers, 3/4 in. thick	Optional
3	1-5/8	3 layers, 5/8 in. thick	Optional
4	1-5/8	4 layers, 5/8 in. thick	Optional
4	1-5/8	4 layers, 1/2 in. thick	Optional
4	2-1/2	2 layers, 3/4 in. thick	2 in.

CGC INC — 1/2 in. thick Type C, IP-X2 or IPC-AR; WRC, 5/8 in. thick Type AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, WRX or WRC; 3/4 in. thick Types IP-X3 or ULTRACODE

UNITED STATES GYPSUM CO — 1/2 in. thick Type C, IP-X2, IPC-AR or WRC; 5/8 in. thick Type SCX, SGX, SHX, WRX, IP-X1, AR, C, WRC, FRX-G, IP-AR, IP-X2, IPC-AR ; 3/4 in. thick Types IP-X3 or ULTRACODE

USG MEXICO S A DE C V — 1/2 in. thick Type C, IP-X2, IPC-AR or WRC; 5/8 in. thick Type AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, WRX, WRC or; 3/4 in. thick Types IP-X3 or ULTRACODE

When Item 7B, Steel Framing Members*, is used, Nonbearing Wall Rating is limited to 1 Hr. Min. stud depth is 3-1/2 in., min. thickness of insulation (Item 4) is 3 in., and two layers of gypsum board panels (1/2 in. or 5/8 in. thick) shall be attached to furring channels as described in Item 6. One layer of gypsum board panels (1/2 in. or 5/8 in. thick) attached to opposite side of stud without furring channels as described in Item 6.

5A. **Gypsum Board*** — (As an alternate to Item 5) — 5/8 in. thick, 24 to 54 in. wide, applied horizontally as the outer layer to one side of the assembly. Secured as described in Item 6.

CGC INC — Type SHX.

UNITED STATES GYPSUM CO — Type FRX-G, SHX.

USG MEXICO S A DE C V — Type SHX.

5B. **Gypsum Board*** — (Not Shown) - As an alternate to Item 5 when used as the base layer on one or both sides of wall when 5/8 in or ¾ in. thick products are specified. For direct attachment only to steel studs Item 2A, (not to be used with Item 3) - Nom 5/8 in. or ¾ in. may be used as alternate to all 5/8 in. or ¾ in. shown in Item 5, Wallboard Protection on Each Side of Wall table. Nom 5/8 in. or ¾ in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over studs and staggered min 1 stud cavity on opposite sides of studs. Gypsum board secured to 20 MSG steel studs Item 2A with 1-1/4 in. long Type S-12 steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field. To be used with Lead Batten Strips (see Item 11) or Lead Discs or Tabs (see Item 12).

RAY-BAR ENGINEERING CORP — Type RB-LBG

5C. **Gypsum Board*** — (For Use With Item 2B) Rating Limited to 1 Hour. 5/8 in. thick, 48 in. wide, Gypsum panels with beveled, square or tapered edges, applied vertically or horizontally. (Vertical Application) - The gypsum board is to be installed on each side of the studs with 1 in. long Type S coated steel screws spaced 8 in. OC starting 4 in. from the edge of the board at the vertical edges and 12 in. OC starting 6 in. from the edge of the board at the center of each board. Gypsum boards are to be secured to the top and bottom track with screws spaced 8 in. OC starting 4 in. from the board edge. Fasteners shall not penetrate through both the stud and the track at the same time. Vertical joints are to be centered over studs and staggered one stud cavity on opposite sides of studs. (Horizontal Application) - The gypsum board is to be installed on each side of the studs with 1 in. long Type S coated steel screws spaced 8 in. OC starting 4 in. from the edge of the board at the vertical edges and 12 in. OC starting 6 in. from the edge of the board at the center of each board. Gypsum boards are to be secured to the top and bottom track with screws spaced 8 in. OC starting 4 in. from the board edge. Fasteners shall not penetrate through both the stud and the track at the same time. All horizontal joints are to be backed as outlined under section VI of Volume 1 in the Fire Resistive Directory.

CGC INC — Type SCX.

UNITED STATES GYPSUM CO — Type SCX, SGX.

USG MEXICO S A DE C V — Type SCX.

5D. **Gypsum Board*** — (As an alternate to Item 5) — 5/8 in. thick, 48 in. wide, applied vertically or horizontally. Secured as described in Item 6. For use with Items 1 and 2 only.

UNITED STATES GYPSUM CO — Type USGX.

5E. **Gypsum Board*** — (Not Shown) - (As an alternate to Item 5 when used as the base layer on one or both sides of wall when 1/2 in. or 5/8 in thick products are specified, For direct attachment only to steel studs Item 2A, not to be used with Item 3). Nominal 5/8 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over studs and staggered min 1 stud cavity on opposite sides of studs. Wallboard secured to studs with 1-1/4 in. long Type S-12 (or No. 6 by 1-1/4 in. long bugle head fine driller) steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field.

NEW ENGLAND LEAD BURNING CO INC, DBA NELCO — Nelco

5F. **Gypsum Board*** — (As an alternate to Item 5) — For use with Items 1E and 2E and limited to 1 Hour Rating only, Gypsum panels with beveled, square or tapered edges, applied vertically, and fastened to the steel studs with 1 in. long Type S screws spaced 8 in. OC along vertical and bottom edges and 12 in. OC in the field. Vertical joints centered over studs and staggered one stud cavity on opposite sides of studs. Steel stud depth shall be a minimum 3-5/8 in.

UNITED STATES GYPSUM CO — 5/8 in. thick Type SCX, SGX.

5G. **Gypsum Board*** — (As an alternate to Item 5) — For use with Items 1E and 2E only, Gypsum panels with beveled, square or tapered edges, applied vertically or horizontally, as specified in the table below and fastened to the steel studs as described in Item 6. Vertical joints centered over studs and staggered one stud cavity on opposite sides of studs. Vertical joints in adjacent layers (multilayer systems) staggered one stud cavity. Horizontal joints need not be backed by steel framing. Horizontal edge joints and horizontal butt joints on opposite sides of studs need not be staggered. Horizontal edge joints and horizontal butt joints in adjacent layers (multilayer systems) staggered a min of 12 in. The thickness and number of layers for the 2 hr, 3 hr and 4 hr ratings are as follows:

Gypsum Board Protection on Each Side of Wall

Rating, Hr	Min Stud Depth, in. Item 2E	No. of Layers & Thickness of Panel	Min Thkns of Insulation (Item 4)
2	1-5/8	2 layers, 1/2 in. thick	Optional
2	1-5/8	2 layers, 5/8 in. thick	Optional
3	1-5/8	3 layers, 1/2 in. thick	Optional
3	1-5/8	3 layers, 5/8 in. thick	Optional
4	1-5/8	4 layers, 5/8 in. thick	Optional
4	1-5/8	4 layers, 1/2 in. thick	Optional

CGC INC — 1/2 in. thick Type C, IP-X2 or IPC-AR;, 5/8 in. thick Type AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, or; 3/4 in. thick Types IP-X3 or ULTRACODE

UNITED STATES GYPSUM CO — 1/2 in. thick Type C, IP-X2, IPC-AR or; 5/8 in. thick Type SCX, SGX, SHX, IP-X1, AR, C, , FRX-G, IP-AR, IP-X2, IPC-AR ; 3/4 in. thick Types IP-X3 or ULTRACODE

USG MEXICO S A DE C V — 1/2 in. thick Type C, IP-X2, IPC-AR or; 5/8 in. thick Type AR, C, IP-AR, IP-X1, IP-X2, IPC-AR, SCX, SHX, or; 3/4 in. thick Types IP-X3 or ULTRACODE

5H. **Gypsum Board*** — (Not Shown) - (As an alternate to Item 5 when used as the base layer on one or both sides of wall when 5/8 or 3/4 in thick products are specified. For direct attachment only to steel studs Item 2A, (not to be used with Item 3) - Nom 5/8 or 3/4 in. may be used as alternate to all 5/8 or 3/4 in. shown in Item 5, Wallboard Protection on Each Side of Wall table. Nom 5/8 or 3/4 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over 20 MSG steel studs and staggered min 1 stud cavity on opposite sides of studs. Wallboard secured to studs with 1-1/4 in. long Type S-12 steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field. Gypsum board secured to 20 MSG steel studs Item 2B with 1-1/4 in. long Type S-12 steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field. For Joint Compound see Item 5. To be used with Lead Batten Strips (see Item 11A) or Lead Discs (see Item 12A).

MAYCO INDUSTRIES INC — Type X-Ray Shielded Gypsum

5I. **Gypsum Board*** — (As an alternate to Item 5) - Nom. 5/8 in. thick gypsum panels with beveled, square or tapered edges installed as described in Item 5. Steel stud minimum depth shall be as indicated in Item 5.

CGC INC — Type ULX

UNITED STATES GYPSUM CO — Type ULX

USG MEXICO S A DE C V — Type ULX

5J. **Gypsum Board*** — (Not Shown) - (As an alternate to Item 5 when used as the base layer on one or both sides of wall when 1/2 in. or 5/8 in thick products are specified, For direct attachment only to steel studs Item 2A, not to be used with Item 3). Nom 5/8 in. thick lead backed gypsum panels with beveled, square or tapered edges, applied vertically. Vertical joints centered over studs and staggered min 1 stud cavity on opposite sides of studs. Wallboard secured to studs with 1-1/4 in. long Type S-12 steel screws gypsum panel steel screws spaced 8 in. OC at perimeter and 12 in. OC in the field. Lead batten strips required behind vertical joints of lead backed gypsum wallboard and optional at remaining stud locations. Lead batten strips, min 2 in. wide, max 8 ft long with a max thickness of 0.14 in. placed on the face of studs and attached to the stud with construction adhesive and two 1 in. long Type S-12 pan head steel screws, one at the top of the strip and one at the bottom of the strip. Lead discs, nominal 3/8 in. diam by max 0.085 in. thick. Compression fitted or adhered over the screw heads. Lead batten strips and discs to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C".

RADIATION PROTECTION PRODUCTS INC — Type RPP - Lead Lined Drywall

5K. **Gypsum Board*** — Nom. 5/8 in. thick gypsum panels with beveled, square or tapered edges installed as described in Item 5. Insulation (Item 4B) required. The steel stud size and type and number of layers are as follows:

Gypsum Board Protection on Each Side of Wall

Rating, Hr	Min Stud Depth, in. Items 2, 2B	No. of Layers & Thickness of Panel
1	3-5/8	1 layer, 5/8 in. thick

UNITED STATES GYPSUM CO — 5/8 in. thick Type ULIX

6. **Fasteners** — (Not shown) — For use with Items 2 and 2F - Type S or S-12 steel screws used to attach panels to studs (Item 2) or furring channels (Item 7). **Single layer systems**: 1 in. long for 1/2 and 5/8 in. thick panels or 1-1/4 in. long for 3/4 in. thick panels, spaced 8 in. OC when panels are applied horizontally, or 8 in. OC along vertical and bottom edges and 12 in. OC in the field when panels are applied vertically. **Two layer systems**: First layer- 1 in. long for 1/2 and 5/8 in. thick panels or 1-1/4 in. long for 3/4 in. thick panels, spaced 16 in. OC. Second layer- 1-5/8 in. long for 1/2 in., 5/8 in. thick panels or 2-1/4 in. long for 3/4 in. thick panels, spaced 16 in. OC with screws offset 8 in. from first layer.**Three-layer systems**: First layer- 1 in. long for 1/2 in., 5/8 in. thick panels, spaced 24 in. OC. Second layer- 1-5/8 in. long for 1/2 in., 5/8 in. thick panels, spaced 24 in. OC. Third layer- 2-1/4 in. long for 1/2 in., 5/8 in. thick panels or 2-5/8 in. long for 5/8 in. thick panels, spaced 12 in. OC. Screws offset min 6 in. from layer below. **Four-layer systems**: First layer- 1 in. long for 1/2 in., 5/8 in. thick panels, spaced 24 in. OC. Second layer- 1-5/8 in. long for 1/2 in., 5/8 in. thick panels, spaced 24 in. OC. Third layer- 2-1/4 in. long for 1/2 in. thick panels or 2-5/8 in. long for 5/8 in. thick panels, spaced 24 in. OC. Fourth layer- 2-5/8 in. long for 1/2 in. thick panels or 3 in. long for 5/8 in. thick panels, spaced 12 in. OC. Screws offset min 6 in. from layer below.

7. **Furring Channels** — (Optional, not shown, for single or double layer systems) — Resilient furring channels fabricated from min 25 MSG corrosion-protected steel, spaced vertically a max of 24 in. OC. Flange portion attached to each intersecting stud with 1/2 in. long Type S-12 steel screws. Not for use with Item 5A and 5E.

7A. **Framing Members*** — (Optional on one or both sides, not shown, for single or double layer systems) — As an alternate to Item 7, furring channels and Steel Framing Members as described below:

a. **Furring Channels** — Formed of No. 25 MSG galv steel. 2-9/16 in. or 2-23/32 in. wide by 7/8 in. deep, spaced max. 24 in. OC perpendicular to studs. Channels secured to studs as described in Item b. Gypsum board attached to furring channels as described in Item 6. Not for use with Item 5A and 5E.

b. **Steel Framing Members*** — Used to attach furring channels (Item 7Aa) to studs (Item 2). Clips spaced max. 48 in. OC. RSIC-1 and RSIC-1 (2.75) clips secured to studs with No. 8 x 1-1/2 in. minimum self-drilling, S-12 steel screw through the center grommet. RSIC-V and RSIC-V (2.75) clips secured to studs with No. 8 x 9/16 in. minimum self-drilling, S-12 steel screw through the center hole. Furring channels are friction fitted into clips. RSIC-1 and RSIC-V clips for use with 2-9/16 in. wide furring channels. RSIC-1 (2.75) and RSIC-V (2.75) clips for use with 2-23/32 in. wide furring channels.

PAC INTERNATIONAL INC — Types RSIC-1, RSIC-V, RSIC-1 (2.75), RSIC-V (2.75).

7B. **Framing Members*** — (Optional, Not Shown) — As an alternate to Item 7, for single or double layer systems, furring channels and Steel Framing Members on only one side of studs as described below:

a. **Furring Channels** — Formed of No. 25 MSG galv steel, spaced 24 in. OC perpendicular to studs. Channels secured to studs as described in Item b. Batts and Blankets placed in stud cavity as described in Item 5. Two layers of gypsum board attached to furring channels as described in Item 5. Not for use with Item 5A and 5E.

b. **Steel Framing Members*** — Used to attach furring channels (Item 7Ba) to one side of studs (Item 2) only. Clips spaced 48 in. OC., and secured to studs with two No. 8 x 2-1/2 in. coarse drywall screws, one through the hole at each end of the clip. Furring channels are friction fitted into clips.

KINETICS NOISE CONTROL INC — Type Isomax

7C. **Framing Members*** — (Not Shown) — (Optional on one or both sides, not shown, for single or double layer systems) — As an alternate to Item 7, furring channels and Steel Framing Members as described below:

a. **Furring Channels** — Formed of No. 25 MSG galv steel. 2-3/8 in. wide by 7/8 in. deep, spaced max. 24 in. OC perpendicular to studs. Channels secured to studs as described in Item b. Gypsum board attached to furring channels as described in Item 6. Not for use with Item 5A and 5E.

b. **Steel Framing Members*** — Used to attach furring channels (Item 7Aa) to studs (Item 2). Clips spaced max. 48 in. OC. GENIECLIPS secured to studs with No. 8 x 1-1/2 in. minimum self-drilling, S-12 steel screw through the center grommet. Furring channels are friction fitted into clips.

PLITEQ INC — Type GENIECLIP

7D. **Steel Framing Members** — (Optional, Not Shown)* - Furring channels and resilient sound isolation clip as described below:

a. **Furring Channels** — Formed of No. 25 MSG galv steel. Spaced 24 in. OC perpendicular to studs. Channels secured to studs as described in Item b. Ends of adjoining channels overlapped 6 in. and secured together with four self-tapping No. 8x1/2 Self Drilling screws (2 per side 1 in. and 4 in. from overlap edge). Gypsum board attached to furring channels as described in Item 4. Side joint furring channels shall be attached to studs with RESILMOUNT Sound Isolation Clips - located approximately 2 in. from each end of length of channel. Both Gypsum Boards at side joints fastened into channel with screws spaced 8 in. OC, approximately 1/2 in. from joint edge. Not for use with Item 5A and 5E.

b. **Steel Framing Members*** — Resilient sound isolation clip used to attach furring channels (Item 7Da) to studs. Clips spaced 24 in. OC., and secured to studs with No. 10 x 2-1/2 in. coarse drywall screw through the center hole. Furring channels are friction fitted into clips.

STUDCO BUILDING SYSTEMS — RESILMOUNT Sound Isolation Clips - Type A237 or A237R

8. **Joint Tape and Compound** — Vinyl or casein, dry or premixed joint compound applied in two coats to joints and screw heads of outer layers. Paper tape, nom 2 in. wide, embedded in first layer of compound over all joints of outer layer panels. Paper tape and joint compound may be omitted when gypsum panels are supplied with a square edge.

9. **Siding, Brick or Stucco** — (Optional, not shown) — Aluminum, vinyl or steel siding, brick veneer or stucco, meeting the requirements of local code agencies, installed over gypsum panels. Brick veneer attached to studs with corrugated metal wall ties attached to each stud with steel screws, not more than each sixth course of brick.

10. **Caulking and Sealants*** — (Optional, not shown) — A bead of acoustical sealant applied around the partition perimeter for sound control.

UNITED STATES GYPSUM CO — Type AS

11. **Lead Batten Strips** — (Not Shown, For Use With Item 5B) - Lead batten strips, min 1-1/2 in. wide, max 10 ft long with a max thickness of 0.125 in. Strips placed on the interior face of studs and attached from the exterior face of the stud with two 1 in. long Type S-12 pan head steel screws, one at the top of the strip and one at the bottom of the strip. Lead batten strips to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C". Lead batten strips required behind vertical joints of lead backed gypsum wallboard (Item 5B) and optional at remaining stud locations. Required behind vertical joints.

11A. **Lead Batten Strips** — (Not Shown, For Use With Item 5H) Lead batten strips, 2 in. wide, max 10 ft long with a max thickness of 0.140 in. Strips placed on the face of studs and attached to the stud with two min. 1 in. long min. Type S-8 pan head steel screws, one at the top of the strip and one at the bottom of the strip or with one min. 1 in. long min. Type S-8 pan head steel screw at the top of the strip. Lead batten strips to have a purity of 99.5% meeting the Federal specification QQ-L-201f, Grades "B, C or D". Lead batten strips required behind vertical joints of lead backed gypsum wallboard and optional at remaining stud locations.

12. **Lead Discs or Tabs** — (Not Shown, For Use With Item 5B) - Used in lieu of or in addition to the lead batten strips (Item 11) or optional at other locations - Max 3/4 in. diam by max 0.125 in. thick lead discs compression fitted or adhered over steel screw heads or max 1/2 in. by 1-1/4 in. by max 0.125 in. thick lead tabs placed on gypsum boards (Item 5B) underneath screw locations prior to the installation of the screws. Lead discs or tabs to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C".

12A. **Lead Discs** — (Not Shown, for use with Item 5H) Max 5/16 in. diam by max 0.140 in. thick lead discs compression fitted or adhered over steel screw heads. Lead discs to have a purity of 99.5% meeting the Federal Specification QQ-L-201f, Grades "B, C or D".

13. **Lead Batten Strips** — (Not Shown, For Use With Item 5E) Lead batten strips, 2 in. wide, max 10 ft long with a max thickness of 0.142 in. Strips placed on the face of studs and attached to the stud with two min. 1 in. long min. Type S-8 pan head steel screws, one at the top of the strip and one at the bottom of the strip or with one min. 1 in. long min. Type S-8 pan head steel screw at the top of the strip. Lead batten strips to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C". Lead batten strips required behind vertical joints of lead backed gypsum wallboard (Item 5E) and optional at remaining stud locations.

14. **Lead Tabs** — (Not Shown, For Use With Item 5E) 2 in. wide, 5 in. long with a max thickness of 0.142 in. Tabs friction-fit around front face of stud, the stud folded back flange, and the back face of the stud. Tabs required at each location where a screw (that secures the gypsum boards, Item 5E) will penetrate the steel stud. Lead tabs to have a purity of 99.9% meeting the Federal specification QQ-L-201f, Grade "C". Lead tabs may be held in place with standard adhesive tape if necessary.

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Last Updated on 2015-02-25

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ASSEMBLY INDEX

U419 1, 2, 3 OR 4 hr NONBEARING GWB WALL

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
SUITE 107
MAITLAND, FL 32751
407.897.6764 (VOICE)
407.894.1338 (FAX)
WWW.MLM-MARTIN.COM
AA-C002208
MLM JOB #: TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	NO SCALE

Drawing Title:

WALL ASSEMBLY LISTING

BID DOCUMENTS

Drawing No.:

AL852

XHBN - Joint Systems

System No. HW-D-0286

June 04, 2010

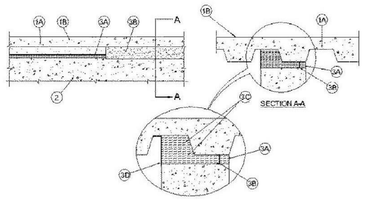
Assembly Rating — 2 Hr

Nominal Joint Width — 2 In.

L Rating At Ambient — Less Than 1 CFM/Lin Ft

L Rating At 400°F — Less Than 1 CFM/Lin Ft

Class II Movement Capabilities — 12.5% Compression



1. **Floor Assembly —** The 2 hr fire-rated fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual D900 Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:

A. **Steel Floor and Form Units* —** Max 3 in. (76 mm) deep galv steel fluted floor units.

B. **Concrete —** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.

2. **Wall Assembly —** Min 8 in. (203 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete. Wall shall be installed parallel with the flutes of the steel floor and form units (Item 1A). Wall may also be constructed of any UL Classified 2 hr fire rated **Concrete Blocks***. When wall is constructed of concrete blocks, the top course of block shall be filled with concrete, grout or mortar.

See Concrete Blocks (CAZT) category in the Fire Resistance Directory for names of manufacturers.

3. **Joint System — Max separation between bottom of spray-applied fire resistive and top of the wall at time of installation of joint system is 2 in. (51 mm). The joint system is designed to accommodate a max 12.5 percent compression or extension from its installed width.** The joint system consists of the following:

A. **Forming Material* —** Min 4 pcf (64 kg/m^3) mineral wool batt insulation cut into strips min 2 in. (51 mm) wide compressed 33 percent in thickness and inserted into the gap between the top of the wall and the bottom of the floor units flush with one surface of the wall.

ROCK WOOL MANUFACTURING CO — Delta Board

B. **Fill, Void or Cavity Material* —** Min 1/8 in. (3.2 mm) wet thickness (min 1/16 in. or 1.6 mm dry thickness) of fill material sprayed or troweled into joint to completely cover mineral wool forming material and to overlap a min of 1/2 in. (13 mm) onto wall and steel deck within joint cavity.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP672 Firestop Spray

C. **Forming Material* —** Min 4 pcf (64 kg/m^3) mineral wool batt insulation cut into strips min 6 in. (152 mm) wide, compressed 33 percent in thickness and inserted into the gap between the top of the wall and the bottom of the floor units flush with the installed forming material Item 3A. When the void beneath the steel deck is located entirely above the wall, the void shall be completely filled with mineral wool insulation compressed 33 percent in thickness. When void beneath the steel deck is located in part above the wall, that portion of the void above the wall shall be packed with additional strips of mineral wool batt insulation compressed 33 percent in thickness flush with the surface of the wall.

ROCK WOOL MANUFACTURING CO — Delta Board

D. **Fill, Void or Cavity Material* —** Min 1/8 in. (3.2 mm) wet thickness (min 1/16 in. or 1.6 mm dry thickness) of fill material sprayed or troweled to completely cover mineral wool forming material and to overlap a min of 1/2 in. (13 mm) onto wall and steel deck on accessible side of the wall.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP672 Firestop Spray or CFS-SP WB Firestop Joint Spray

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Last Updated on 2010-06-04

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XHBN - Joint Systems

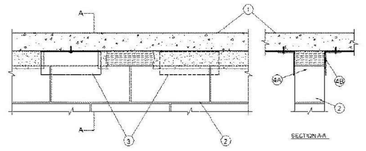
System No. HW-D-1045

June 07, 2010

Assembly Rating — 2 Hr

Nominal Joint Width — 3-1/2 In.

Class II Movement Capabilities — 14% Compression and Extension



1. **Floor Assembly —** Min 4-1/2 in. thick steel reinforced lightweight or normal weight (100-150 pcf) structural concrete.

2. **Wall Assembly —** Min 8 in. thick steel reinforced lightweight or normal weight (100-150 pcf) structural concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***.

See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

3. **Steel Angles —** Nom 5 in. by 3 in. by 12 MSG (or heavier) steel angles, max 12 in. long, staggered max 24 in. OC on opposite sides of wall with 3 in. leg fastened to concrete floor assembly.

4. **Joint System — Max separation between bottom of floor units and top of concrete wall at time of installation is 3-1/2 in. The joint system is designed to accommodate a max 14 percent compression or extension from its installed width.** The joint system shall consists of the following:

A. **Forming Material* —** Nominal 4 in thick pieces of nominal 4 pcf forming material, min 8 in. wide, shall be compressed 50 percent in thickness and installed edge first into joint opening between bottom of floor assembly and top of concrete wall.

THERMAFIBER INC — Type SAF

B. **Fill, Void or Cavity Material* - Sealant —** A 1/8 in. wet thickness of fill material sprayed of troweled on each side of wall to completely cover mineral wool forming material and to overlap a min 1/2 in. onto steel angles, concrete floor assembly and concrete wall.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP672 Firestop Spray or CFS-SP WB Firestop Joint Spray

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XHBN - Joint Systems

System No. HW-D-0538

December 16, 2015

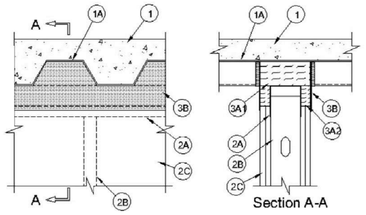
Assembly Ratings — 1 And 2 Hr (See Item 2)

Nominal Joint Width — 1-1/2 In.

Class II Movement Capabilities — 50% Compression or Extension

L Rating At Ambient — Less Than 1 CFM/Lin Ft

L Rating At 400°F — Less Than 1 CFM/Lin Ft



1. **Floor Assembly —** The fire rated fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual D700 or D900 Series Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:

A. **Steel Floor and Form Units* —** Max 3 in. (76 mm) deep galv steel fluted floor units.

B. **Concrete —** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.

C. **Steel Attachment Clips —** (Optional. Not Shown) - Used to secure ceiling runner when spray-applied fire resistive material (Item 1D) is applied to floor units prior to installation of ceiling runner of wall. Z-shaped clips formed from 1 in. (25 mm) wide strips of min 20 ga galv steel. Clips to be sized to extend through the thickness of the spray-applied fire-resistive material on the steel floor unit with 1-1/2 in. (38 mm) long upper and lower legs. Legs of clips fastened to bottom of floor units (prior to application of spray-applied fire-resistive materials) with steel fasteners or welds. Clips spaced max 16 in. (406 mm) OC and extend to within 1/4 to 3/4 in. (6 to 19 mm) from the surface of the wall.

D. **Spray-Applied Fire Resistive Material* —** (Optional. Not Shown) - After installation of the ceiling runner, or prior to installation of the ceiling runner and after installation of the steel attachment clips (Item 1C), the steel floor units may be sprayed with the min thickness of material specified in the individual D700 Series Design.

ISOLATEK INTERNATIONAL — Type 300

GCP APPLIED TECHNOLOGIES INC — Type MK-6/HY

1A. **Roof Assembly —** (Not Shown) — As an alternate to the floor assembly, a fire rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P900 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly rating of the roof assembly shall be equal to or greater than the hourly rating of the wall assembly. The roof assembly shall include the following construction features:

A. **Steel Roof Deck —** Max 3 in. (76 mm) deep galv steel fluted roof deck.

B. **Roof Insulation —** Min 2-1/4 in. (57 mm) thick poured insulating concrete, as measured from the top plane of the steel roof deck.

1B. **Roof Assembly —** As an alternate to Items 1 and 1A, a fire rated protected fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P700 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly rating of the roof assembly shall be equal to or greater than the hourly rating of the wall assembly. The roof assembly shall include the following construction features:

A. **Steel Roof Deck —** Max 3 in. (76 mm) deep galv steel fluted roof deck.

B. **Steel Attachment Clips —** (Optional. Not Shown) - Used to secure ceiling runner when spray-applied fire resistive material is applied to roof deck prior to installation of ceiling runner of wall. Z-shaped clips formed from 1 in. (25 mm) wide strips of min 20 ga galv steel. Clips to be sized to extend through the thickness of the spray-applied fire-resistive material on the roof deck with 1-1/2 in. (38 mm) long upper and lower legs. Legs of clips fastened to bottom of roof deck (prior to application of spray-applied fire-resistive materials) with steel fasteners or welds. Clips spaced max 16 in. (406 mm) OC and extend to within 1/4 to 3/4 in. (6 to 19 mm) from the surface of the wall.

C. **Spray—Applied Fire Resistive Materials* —** (Not Shown)—Prior to or after the installation of the steel ceiling runners, the roof assembly shall be sprayed with the type and thickness of fire resistive material indicated in the individual P700 Series design.

ISOLATEK INTERNATIONAL — Type 300

GCP APPLIED TECHNOLOGIES INC — Type MK-6/HY

2. **Wall Assembly —** The 1 hr or 2 hr fire rated gypsum board/steel stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V400 Series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

A. **Steel Floor and Ceiling Runners —** Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). Flange height of ceiling runner shall be min 1/4 in. (6 mm) greater than max extended joint width. Ceiling runner installed perpendicular to the deck direction and secured to valleys of deck with masonry anchors, steel fasteners or welds spaced max 24 in. (610 mm) OC. *For floor or roof decks with* spray-applied fire resistive material, ceiling runner attached to steel attachment clips (Item 1C) with masonry anchors, steel fasteners or welds spaced max 16 in. (406 mm) OC.

A1. **Light Gauge Framing*-Slotted Ceiling Runner —** As an alternate to the ceiling runner in Item 2A, slotted ceiling runner to consist of galv steel channel with slotted flanges sized to accommodate steel studs (Item 2B). Slotted ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys before or after optional spray-applied fire resistive material is used with steel masonry anchors, steel fasteners or welds spaced max 24 in. (610 mm) OC. The use of welds to secure the ceiling runner may only be used prior to the installation of the optional spray-applied material.

BRADY CONSTRUCTION INNOVATIONS INC, DBA SLIPTRACK SYSTEMS — SLP-TRK, SLPTRK325

SCAFCO STEEL STUD MANUFACTURING CO

THE STEEL NETWORK INC — Vert/Track VT series, 250VT, 362VT, 400VT, 600VT and 800VT

A2. **Light Gauge Framing* — Slotted Ceiling Runner —** As an alternate to the ceiling runner in Item 2A through 2A1, ceiling runner to consist of galv steel channel with slotted flanges sized to accommodate steel studs (Item 2B). Flange height of slotted ceiling runner shall be 3-1/4 in. (83 mm) with 2 in. (51 mm) deep slots. Slotted ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys as described in Item A1.

SCAFCO STEEL STUD MANUFACTURING CO — Slotted Track-Type SDLT

B. **Studs —** Steel studs to be min 3-1/2 in. (89 mm) wide. Studs cut 1-1/4 in. to 1-1/2 in. (32 to 38 mm) less in length than assembly height with bottom nesting in and resting on floor runner and with top nesting in ceiling runner without attachment. Stud spacing not to exceed 24 in. (610 mm) OC. When slotted ceiling runner (Item 2A2) is used, steel studs cut in lengths 3/4 to 1-3/4 in. (19 to 44 mm) less than floor to ceiling height and secured to slotted ceiling runner with No. 8 by 1/2 (13 mm) long wafer head steel screws at +/- 3/16 in. (5 mm) of the mid-height of slot on each side of wall.

C. **Gypsum Board* —** Gypsum board installed to a min total thickness of 5/8 in. (16 mm) or 1-1/4 in. (32 mm) on each side of wall for 1 hr and 2 hr rated assemblies, respectively. Wall to be constructed as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory, except that a nom 1-1/2 in. (38 mm) gap shall be maintained between the top of the gypsum board and the bottom of the steel deck and the top row of screws shall be installed 1 to 1-1/2 in. (25 to 38 mm) below the bottom of the ceiling runner.

The hourly rating of the joint system is dependent on the hourly rating of the wall.

3. **Joint System —** Max separation between bottom plane of floor or roof and top of gypsum board at time of installation of joint system is 1-1/2 in. (38 mm). The joint system is designed to accommodate a max 50 compression or extension from its installed width. The joint system consists of forming material and a fill material as follows:

A. **Forming Material* —** Min 4 pcf (64 kg/m^3) forming material sized to attain a min compression rate of 25 percent in the thickness direction and firmly packed to completely fill the flutes. Alternately, nom 4 pcf (64 kg/m^3) forming material cut to shape of flute and nom 1 in. (25 mm) longer than thickness of wall; mineral wool compressed from ends and firmly packed into each flute to attain a min compression rate of 14.3 percent in the length (wall thickness) direction to be flush with both wall surfaces. Additional pieces of batt insulation, 5/8 or 1-1/4 in. (16 or 32 mm) wide, shall be compressed 50 percent in thickness and installed cut edge first into gap between bottom of fluted floor or roof units and forming material within flutes. and top of gypsum board.

INDUSTRIAL INSULATION GROUP L L C — MinWool-1200 Safing

JOHNS MANVILLE — Safing

ROCK WOOL MANUFACTURING CO — Delta Board

ROCKWOOL — SAFE

THERMAFIBER INC — Type SAF

A1. **Forming Material*—Plugs —** As an alternate to Item 3A, preformed mineral wool plugs, formed to the shape of the fluted floor units, friction fit to completely fill the flutes above the ceiling runner. The plugs shall project beyond each side of the ceiling runner, flush with wall surfaces. Additional forming material, described in Item 3A2, to be used in conjunction with the plugs to fill the gap between the top of gypsum board and the bottom of plug.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP777 Speed Plugs

A2. **Forming Material* - Strips —** Nom 5/8 in. (16 mm) and 1-1/4 in. (32 mm) wide precut mineral wool strips for 1 and 2 hr rated assemblies, respectively. The strips are compressed 50 percent in thickness and firmly packed into the gap between the top of the gypsum board and bottom of the steel floor or roof deck on both sides of the wall.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 767 Speed Strips

B. **Fill, Void or Cavity Material* —** Min 1/16 in. (1.6 mm) dry thickness (min 1/8 in. or 3.2 mm wet thickness) of fill material sprayed on each side of the wall to completely cover mineral wool forming material and to overlap a min of 1/2 in. (13 mm) onto gypsum board and min of 1/2 in. (13 mm) onto the steel deck or 2 in. (51 mm) onto the spray-applied fire resistive material on steel deck, on both sides of wall.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CFS-SP WB Firestop Joint Spray

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Last Updated on 2015-12-16

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XHBN - Joint Systems

System No. HW-D-0539

December 16, 2015

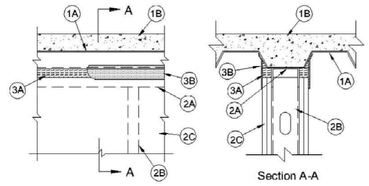
Assembly Ratings — 1 and 2 Hr (See Item 2)

Nominal Joint Width — 1-1/2 In.

Class II Movement Capabilities — 50% Compression or Extension

L Rating At Ambient — Less Than 1 CFM/Lin Ft

L Rating At 400°F — Less Than 1 CFM/Lin Ft



1. **Floor Assembly —** The fire-rated fluted steel deck/concrete floor assembly shall be constructed of the materials and in the manner described in the individual D700 or D900 Series Floor-Ceiling Design in the UL Fire Resistance Directory and shall include the following construction features:

A. **Steel Floor and Form Units* —** Max 3 in. (76 mm) deep galv steel fluted floor units.

B. **Concrete —** Min 2-1/2 in. (64 mm) thick reinforced concrete, as measured from the top plane of the floor units.

C. **Steel Attachment Clips —** — (Optional. Not Shown) - Used to secure ceiling runner when spray-applied fire resistive material (Item 13) is applied to floor units prior to installation of ceiling runner of wall. Z-shaped clips formed from 1 in. (25 mm) wide strips of min 20 ga galv steel. Clips to be sized to extend through the thickness of the spray-applied fire-resistive material on the steel floor unit with 1-1/2 in. (38 mm) long upper and lower legs. Legs of clips fastened to bottom of floor units (prior to application of spray-applied fire-resistive materials) with steel fasteners or welds. Clips spaced max 16 in. (406 mm) OC and extend to within 1/4 to 3/4 in. (6 to 19 mm) from the surface of the wall.

D. **Spray-Applied Fire Resistive Material* —** — (Optional. Not Shown) - After installation of the ceiling runner, or prior to installation of the ceiling runner and after installation of the steel attachment clips (Item 1C), the steel floor units may be sprayed with the min thickness of material specified in the individual D700 Series Design.

ISOLATEK INTERNATIONAL — Type 300

GCP APPLIED TECHNOLOGIES INC — Type MK-6/HY

1A. **Roof Assembly —** (Not Shown) — As an alternate to the floor assembly, a fire rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P900 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly rating of the roof assembly shall be equal to or greater than the hourly rating of the wall assembly. The roof assembly shall include the following construction features:

A. **Steel Roof Deck —** Max 3 in. (76 mm) deep galv steel fluted roof deck.

B. **Roof Insulation —** Min 2-1/4 in. (57 mm) thick poured insulating concrete, as measured from the top plane of the steel roof deck.

1B. **Roof Assembly —** As an alternate to Items 1 and 1A, a fire rated protected fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P700 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly rating of the roof assembly shall be equal to or greater than the hourly rating of the wall assembly. The roof assembly shall include the following construction features:

A. **Steel Roof Deck —** Max 3 in. (76 mm) deep galv steel fluted roof deck.

B. **Steel Attachment Clips —** (Optional. Not Shown) - Used to secure ceiling runner when spray-applied fire resistive material is applied to roof deck prior to installation of ceiling runner of wall. Z-shaped clips formed from 1 in. (25 mm) wide strips of min 20 ga galv steel. Clips to be sized to extend through the thickness of the spray-applied fire-resistive material on the roof deck with 1-1/2 in. (38 mm) long upper and lower legs. Legs of clips fastened to bottom of roof deck (prior to application of spray-applied fire-resistive materials) with steel fasteners or welds. Clips spaced max 16 in. (406 mm) OC and extend to within 1/4 to 3/4 in. (6 to 19 mm) from the surface of the wall.

C. **Spray—Applied Fire Resistive Materials* —** (Not Shown)—Prior to or after the installation of the steel ceiling runners, the roof assembly shall be sprayed with the type and thickness of fire resistive material indicated in the individual P700 Series design.

ISOLATEK INTERNATIONAL — Type 300

GCP APPLIED TECHNOLOGIES INC — Type MK-6/HY

2. **Wall Assembly —** The 1 hr or 2 hr fire rated gypsum board /steel stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 or V400 Series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

A. **Steel Floor and Ceiling Runners —** Floor and ceiling runners of wall assembly shall consist of galv steel channels sized to accommodate steel studs (Item 2B). Flange height of ceiling runner shall be min 1/4 in. (6 mm) greater than max extended joint width.. Ceiling runner centered beneath and parallel with the valley of the deck and secured to valley with steel fasteners, steel masonry anchors or welds spaced max 24 in. (610 mm) OC. For floor or roof decks with spray-applied fire resistive material, ceiling runner attached to steel attachment clips (Item 1C) with steel fasteners spaced max 16 in. (406 mm) OC.

A1. **Light Gauge Framing*-Slotted Ceiling Runner —** As an alternate to the ceiling runner in Item 2A, slotted ceiling runner to consist of galv steel channel with slotted flanges sized to accommodate steel studs (Item 2B). Slotted ceiling runner installed perpendicular to direction of fluted steel deck and secured to valleys before or after optional spray-applied fire resistive material is used with steel masonry anchors, steel fasteners or welds spaced max 24 in. (610 mm) OC. The use of welds to secure the ceiling runner may only be used prior to the installation of the optional spray-applied material.

BRADY CONSTRUCTION INNOVATIONS INC, DBA SLIPTRACK SYSTEMS — SLP-TRK, SLPTRK325

SCAFCO STEEL STUD MANUFACTURING CO

THE STEEL NETWORK INC — Vert/Track VT series, 250VT, 362VT, 400VT, 600VT and 800VT

A2. **Light Gauge Framing* — Slotted Ceiling Runner —** As an alternate to the ceiling runner in Item 2A through 2A1, ceiling runner to consist of galv steel channel with slotted flanges sized to accommodate steel studs (Item 2B). Flange height of slotted ceiling runner shall be 3-1/4 in. (83 mm) with 2 in. (51 mm) deep slots. Slotted ceiling runner centered beneath and parallel with the valley of the deck and secured to valley as described in Item A1.

SCAFCO STEEL STUD MANUFACTURING CO — Slotted Track-Type SDLT

B. **Studs —** Steel studs to be min 3-1/2 in. (89 mm) wide. Studs cut 1-1/4 in. to 1-1/2 in. (32 to 38 mm) less in length than assembly height with bottom nesting in and resting on floor runner and with top nesting in ceiling runner without attachment. Stud spacing not to exceed 24 in. (610 mm) OC. When slotted ceiling runner (Item 2A2) is used, steel studs cut in lengths 3/4 to 1-3/4 in. (19 to 44 mm) less than floor to ceiling height and secured to slotted ceiling runner with No. 8 by 1/2 (13 mm) long wafer head steel screws at +/- 3/16 in. (5 mm) of the mid-height of slot on each side of wall.

C. **Gypsum Board* —** Gypsum board installed to a min total thickness of 5/8 in. (16 mm) or 1-1/4 in. (32 mm) on each side of wall for 1 hr and 2 hr rated assemblies, respectively. Wall to be constructed as specified in the individual Wall and Partition Design in the UL Fire Resistance Directory, except that a nom 1-1/2 (38 mm) gap shall be maintained between the top of the gypsum board and the bottom of the steel deck and the top row of screws shall be installed into the studs 1 to 1-1/2 in. (25 to 38 mm) below the bottom of the ceiling runner.

The hourly rating of the joint system is dependent on the hourly rating of the wall.

3. **Joint System —** Max separation between bottom of floor or roof and top of gypsum board at time of installation of joint system is 1-1/2 in. (38 mm). The joint system is designed to accommodate a max 50 percent compression or extension from its installed width. The joint system consists of forming material and a fill material, as follows:

A. **Forming Material* —** Nom 5/8 in. or 1-1/4 in. (16 or 32 mm) wide strips of min 4 pcf (64 kg/m^3) mineral wool batt insulation, for 1 and 2 hr rated assemblies, respectively. Strips compressed 50 percent in thickness and inserted cut-edge first into gap between top of gypsum board and bottom of the floor or roof deck, flush with both surfaces of the wall.

INDUSTRIAL INSULATION GROUP L L C — MinWool-1200 Safing

JOHNS MANVILLE — Safing

ROCK WOOL MANUFACTURING CO — Delta Board

ROCKWOOL — SAFE

THERMAFIBER INC — Type SAF

A1. **Forming Material*—Strips —** As an alternate to Item 3A, nom 5/8 in.(16 mm) and 1-1/4 in. (32 mm) wide precut mineral wool strips for 1 and 2 hr rated assemblies, respectively. The strips are compressed 50 percent in thickness and inserted cut-edge first into the gap between the top of the gypsum board and the bottom of the floor or roof deck, flush with both surfaces of the wall.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 767 Speed Strips

B. **Fill, Void or Cavity Material* —** Min 1/16 in. (1.6 mm) dry thickness (min 1/8 in. or 3.2 mm wet thickness) of fill material sprayed on each side of the wall to completely cover mineral wool forming material and to overlap a min of 1/2 in. (13 mm) onto gypsum board and steel deck, and 2 in. (51 mm) onto the spray-applied fire resistive material (Item 1D), on both sides of wall.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CFS-SP WB Firestop Joint Spray

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2015-12-16

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ASSEMBLY INDEX

HW-D-1045 2 hr CMU HO WALL

HW-D-0286 2 hr CONC/CMU HO WALL

HW-D-0538 1 or 2 hr GWB HO WALL

HW-D-0539 1 or 2 hr GWB HO WALL

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
SUITE 107
MAITLAND, FL 32751
407.897.6764 (VOICE)
407.894.1338 (FAX)
WWW.MLM-MARTIN.COM
AA-C002208
MLM JOB #: TYP. PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	**MLM-19672**
Designed By:	**MLM, MAM**
Drawn By:	**ST, CC, DM, CB**
Checked By:	**MAM**
Issue Date:	**30-NOV-2020**
Drawing Scale:	**NO SCALE**

Drawing Title:

JOINT ASSEMBLY LISTING

BID DOCUMENTS

Drawing No.:

AL861

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

12/8/2020 5:55:53 PM

XHBN - Joint Systems

XHBN7 - Joint Systems Certified for Canada

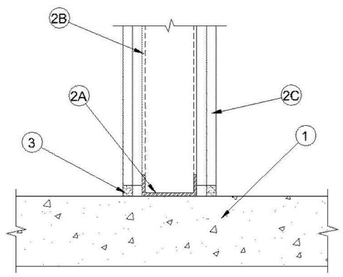
See General Information for Joint Systems

See General Information for Joint Systems Certified for Canada

System No. BW-S-0002

June 29, 2015

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 and 2 Hr (See Item 1)	F Ratings — 1 and 2 Hr (See Item 1)
Nominal Joint Width - 3/4 In.	FT Ratings — 1 and 2 Hr (See Item 1)
L Rating at Ambient — Less than 1 CFM/Lin Ft	FH Ratings — 1 and 2 Hr (See Item 1)
L Rating at 400° F — Less than 1 CFM/Lin Ft	FTH Ratings — 1 and 2 Hr (See Item 1)
	Nominal Joint Width - 3/4 In.
	L Rating at Ambient — Less than 1 CFM/Lin Ft
	L Rating at 400° F — Less than 1 CFM/Lin Ft



1. **Floor Assembly —** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete. Floor may also be constructed of any 6 in. (152 mm) thick UL Classified hollow-core **Precast Concrete Units***.

See **Precast Concrete Units** category in the Fire Resistance Directory for names of manufactures.

2. **Wall Assembly —** The 1 or 2 h fire-rated gypsum board/steel stud wall assembly shall be constructed of the materials and in the manner specified in the individual U400, V400 or W400 Series Wall or Partition Design in the UL Fire Resistance Directory. In addition, the wall may incorporate a head-of-wall joint system as specified in the HW Series Joint Systems in the UL Fire Resistance Directory. The wall shall include the following construction features:

A. **Steel Floor Runners —** Floor runners of wall assembly shall consist of min No. 25 gauge galv steel channels sized to accommodate steel studs (Item 2B). Floor runners to be provided with 1-1/4 in. (32 mm) flanges. Runners secured with steel fasteners spaced 12 in. (305 mm) OC.

B. **Studs —** Steel studs to be min 3-1/2 in. (89 mm) wide. Studs cut 1/2 to 3/4 in. (13 to 19 mm) less in length than assembly height with bottom nesting in, resting on and fastened to floor runner with sheet metal screws. Stud spacing not to exceed 24 in. (610 mm) OC.

C. **Gypsum Board* —** Gypsum board installed to a min total thickness of 5/8 or 1-1/4 in. (16 or 32 mm) on each side of wall for a 1 or 2 hr rated wall, respectively. Wall to be constructed as specified in the individual U400, V400 or W400 Series Design in the UL Fire Resistance Directory, except that a max 3/4 in. (19 mm) gap shall be maintained between the bottom of gypsum board and top of concrete floor. **The hourly fire rating of the joint system is equal to the hourly fire rating of the wall.**

3. Fill, **Void or Cavity Material* Sealant — Max separation between top of floor and bottom of gypsum board wall sheathing is 3/4 in. (19 mm).** Min 5/8 in. (16 mm) thickness of fill material installed on each side of the wall between the bottom of the gypsum board and the top of the concrete floor, flush with each surface of the wall.
HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP 605 Bottom of Wall Firestop Sealant, CP601S Elastomeric Firestop Sealant, CP606 Flexible Firestop Sealant, CFS-S SIL GG, FS-ONE Sealant or FS-ONE MAX Intumescent Sealant

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2015-06-29

Design/System/Construction/Assembly Usage Disclaimer

- Authorities Having Jurisdiction should be consulted in all cases as to the particular requirements covering the installation and use of UL Certified products, equipment, system, devices, and materials.
- Authorities Having Jurisdiction should be consulted before construction.
- Fire resistance assemblies and products are developed by the design submitter and have been investigated by UL for compliance with applicable requirements. The published information cannot always address every construction nuance encountered in the field.
- When field issues arise, it is recommended the first contact for assistance be the technical service staff provided by the product manufacturer noted for the design. Users of fire resistance assemblies are advised to consult the general Guide Information for each product category and each group of assemblies. The Guide Information includes specifics concerning alternate materials and alternate methods of construction.
- Only products which bear UL's Mark are considered Certified.

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XHBN - Joint Systems

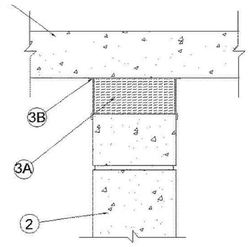
System No. HW-D-0097

June 04, 2010

Assembly Rating — 2 Hr

Nominal Joint Width — 2 In.

Class II Movement Capabilities — 14% Compression or Extension



1. **Floor Assembly —** Min 4-1/2 in. thick steel-reinforced lightweight or normal weight (100-150 pcf) structural concrete.

2. **Wall Assembly —** Min 8 in. thick steel-reinforced lightweight or normal weight (100-150 pcf) structural concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***.

See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

3. **Joint System — Max width of joint (at time of installation of joint system) is 2 in. The joint system is designed to accommodate a max 14 percent compression or extension from its installed width.** The joint system shall consist of the following:

A. **Forming Material —** Min 4.0 pcf mineral wool batt insulation installed in joint opening as a permanent form. Batt cut to min width of 8 in. and installed cut edge-first into joint opening, parallel with joint direction, such that batt sections are compressed min 50 percent in thickness and such that the compressed batt sections are flush with both surfaces of wall. Adjoining lengths of batt to be tightly butted with butted seams spaced min 48 in. apart along the lengths of the joint.

ROCK WOOL MANUFACTURING CO — Delta Board

B. **Fill, Void or Cavity Material* —** Min 1/8 in. wet thickness of fill material sprayed or trowelled on each side of wall to completely cover mineral wool forming material and to overlap a min 1/2 in. onto concrete floor and concrete wall.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP672 Firestop Spray or CFS-SP WB Firestop Joint Spray

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2010-06-04

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XHBN - Joint Systems

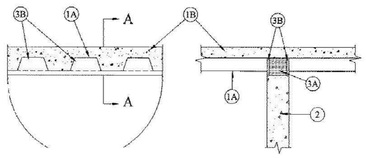
System No. HW-D-0225

March 08, 2002

Assembly Rating - 2 Hr

Nominal Joint Width - 2-1/4 in.

Class II Movement Capabilities - 11% Compression or Extension



SECTION A-A

1. **Floor Assembly** — The fire-rated fluted steel floor unit/concrete floor assembly shall be constructed of the materials and in the manner described in the individual D900 Series Floor-Ceiling Design in the Fire Resistance Directory and shall include the following construction features:

A. **Steel Floor and Form Units* —** Max 3 in. deep galv steel fluted floor units.

B. **Concrete —** Min 2-1/2 in. thick reinforced concrete, as measured from the top plane of the floor units.

2. **Wall Assembly —** Min 5 in. thick steel reinforced lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of an UL Classified Concrete Blocks*.

See **Concrete Block** (CAZT) category in the Fire Resistance Directory for names of manufactures.

3. **Joint System —** Max separation between valleys of fluted steel floor unit and top of wall is 2-1/4 in., providing separation at crests of floor unit does not exceed 3-3/4 in. The joint system is designed to accommodate a max 11 percent compression or extension from the nom installed joint width. The joint system consists of a packing material and a fill material between the top of the gypsum board and the bottom of the floor, as follows:

A. **Forming Material —** Sections of min 4 pcf density mineral wool batt insulation inserted between top of wall and bottom of floor, compressed approx 20 percent in thickness beneath each valley. Additional pieces of mineral wool cut to the shape of the flute, stacked to a thickness approx 20 percent greater than the overall thickness of the opening and installed in the flutes above the wall. The forming material shall be recessed 1/2 in. from each side of the wall.

A1. **Forming Material* —** Plugs (Optional-Not Shown) Performed mineral wool plugs, formed to the shape of the fluted deck, friction fit to completely fill the flutes. The plugs shall be recessed 1/2 in. from both wall surfaces. Additional forming material, described in Item 3A, to be used in conjunction with the plugs to fill the gap between the top of the wall and bottom of steel deck.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP777 Speed Plugs

B. **Fill, Void or Cavity Material* —** Sealant Min 1/2 in. thickness of fill material installed on each side of the wall in the flutes of the steel floor units and between the top of the wall and the bottom of the steel floor units, flush with each surface of the wall.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP606 Flexible Firestop Sealant

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2002-03-08

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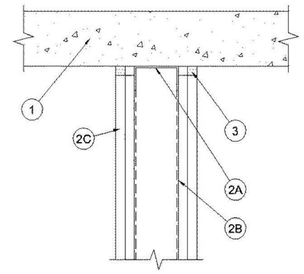
XHBN - Joint Systems

XHBN7 - Joint Systems Certified for Canada

System No. HW-D-0209

February 23, 2015

ANSI/UL2079	CAN/ULC S115
Assembly Ratings — 1 and 2 Hr (See Item 2)	F Ratings — 1 and 2 Hr (See Item 2)
Nominal Joint Width - 1 In.	FT Ratings — 1 and 2 Hr (See Item 2)
Class II Movement Capabilities — 19% Compression or Extension	FH Ratings — 1 and 2 Hr (See Item 2)
L Rating At Ambient — Less Than 1 CFM/lin ft (See Item 3)	FTH Ratings — 1 and 2 Hr (See Item 2)
L Rating At 400 F — Less Than 1 CFM/lin ft (See Item 3)	Nominal Joint Width - 1 In.
	Class II Movement Capabilities — 19% Compression or Extension
	L Rating At Ambient — Less Than 1 CFM/lin ft (See Item 3)
	L Rating At 400 F — Less Than 1 CFM/lin ft (See Item 3)



1. **Floor Assembly —** Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m^3) structural concrete. Floor may also be constructed of any 6 in. (152 mm) thick UL Classified hollow-core **Precast Concrete Units***.

See **Precast Concrete Units** category in the Fire Resistance Directory for names of manufactures.

2. **Wall Assembly —** The 1 or 2 h fire rated gypsum board/steel stud wall assembly shall be constructed of the materials and in the manner specified in the individual U400, V400 or W400 Series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

A. **Steel Floor and Ceiling Runners —** Floor and ceiling runners of wall assembly shall consist of min No. 25 gauge galv steel channels sized to accommodate steel studs (Item 2B). Flange height of ceiling runner shall be min 1/4 in. (6 mm) greater than max extended joint width. Ceiling runner secured with masonry anchors or steel fasteners spaced 24 in. (610 mm) OC.

A1. **Light Gauge Framing* —** Slotted Ceiling Runner - As an alternate to the ceiling runner in Item 2A, slotted ceiling runner to consist of galv steel channel with slotted flanges sized to accommodate steel studs (Item 2B). Slotted ceiling runner secured to valleys lower surface of floor with steel fasteners spaced max 24 in. (610 mm) OC.

BRADY CONSTRUCTION INNOVATIONS INC, DBA SLIPTRACK SYSTEMS — SLP-TRK

CALIFORNIA EXPANDED METAL PRODUCTS CO — CST

MARINO/WARE, DIV OF WARE INDUSTRIES INC — Type SLT

A2. **Light Gauge Framing* —** Vertical Deflection Ceiling Runner - As an alternate to the ceiling runners in Items 2A and 2A1, vertical deflection ceiling runner to consist of galv steel channel with slotted vertical deflection clips mechanically fastened within runner. Slotted clips provided with step bushings for permanent fastening of steel studs. Flanges sized to accommodate steel studs (Item 2B). Vertical deflection ceiling runner secured to lower surface of floor with steel fasteners spaced max 24 in. (610 mm) OC.

THE STEEL NETWORK INC — VertiTrack VTD250, VTD362, VTD400, VTD600 and VTD800

B. Studs — Steel studs to be min 3-1/2 in. (89 mm) wide. Studs cut 1/2 to 3/4 in. (13 to 19 mm) less in length than assembly height with bottom nesting in and resting on floor runner and with top nesting in ceiling runner without attachment. When slotted ceiling runner (Item 2A1) is used, steel studs secured to slotted ceiling runner with No. 8 by 1/2 in. (13 mm) long wafer head steel screws at midheight of slot on each side of wall. Stud spacing not to exceed 24 in. (610 mm) OC. When vertical deflection ceiling runner (Item 2A2) is used, steel studs secured to slotted vertical deflection clips, through the bushings, with steel screws at midheight of each slot. Stud spacing not to exceed 24 in. (610 mm) OC.

C. **Gypsum Board* —** For 1 hr assembly, one layer of 5/8 in. (16 mm) thick gypsum board is required in the individual Wall and Partition Design. For 2 hr assembly, two layers of 5/8 in. (16 mm) thick gypsum board is required in the individual Wall and Partition Design. Wall to be constructed as specified in the individual U400 or V400 Series Design in the UL Fire Resistance Directory, except that a max 1 in. (25 mm) gap shall be maintained between the top of gypsum board and bottom of concrete floor. The screws attaching the gypsum board to the studs at the top of the first layer shall be located 4 in. (102 mm) below the floor. The screws attaching the second layer to the steel studs shall be installed into the studs 3-1/2 in. (89 mm) below the floor.

The hourly fire rating of the joint system is equal to the hourly ratings of the walls.

3. **Fill, Void or Cavity Material* - Sealant — Max separation between bottom of floor and top of wall is 1 in. (25 mm). The joint system is designed to accommodate a max 19 percent compression or extension from its installed width.** Min 5/8 in. (16 mm) thickness of fill material installed on each side of the wall between the top of the gypsum board and the bottom of the concrete floor, flush with each surface of the wall.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP601S Elastomeric Firestop Sealant or CP606 Flexible Firestop Sealant or CFS-S SIL GG Sealant. L Ratings apply only when CP606 or CFS-S SIL GG Sealant is used.

4. **Forming Material —** (Optional, Not Shown) - Mineral wool insulation, fiberglass batt insulation or polyurethane/polyethylene foam backer rod. Forming material to be recessed from both surfaces of the 2 hr fire rated wall to accommodate the required thickness of fill material.

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2015-02-23

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XHBN - Joint Systems

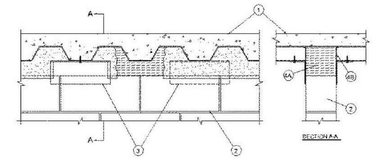
System No. HW-D-1044

June 07, 2010

Assembly Rating — 2 Hr

Nominal Joint Width — 3-1/2 In.

Class II Movement Capabilities — 14% Compression and Extension



1. **Floor Assembly —** The fire-rated fluted steel floor unit/concrete floor assembly shall be constructed of the materials and in the manner described in the individual Floor-Ceiling Design in the Fire Resistance Directory and shall include the following construction features:

A. **Steel Floor and Form Units* —** Max 3 in. deep galv steel fluted floor units.

B. **Concrete —** Min 2-1/2 in. thick reinforced concrete, as measured from the top plane of the floor units.

C. **Spray-Applied Fire Resistive Materials* —** (Optional)- (Not Shown)-Prior to the installation of the forming material and fill, void or cavity material (Items 3A, 3B) the steel floor units may be sprayed with a min 5/16 in. to max 1-3/4 in. thickness of fire resistive material.

GCP APPLIED TECHNOLOGIES INC — Type MK-6-HY

1A. **Roof Assembly —** (Not Shown) As an alternate to the floor assembly, a fire rated fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P900 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly rating of the roof assembly shall be equal to or greater than the hourly rating of the wall assembly. The roof assembly shall include the following construction features:

A. **Steel Roof Deck —** Max 3 in. deep galv steel fluted roof deck.

B. **Roof Insulation —** Min 2-1/4 in. thick poured insulating concrete, as measured from the top plane of the floor units.

1B. **Roof Assembly —** As an alternate to Items 1 and 1A, a fire rated protected fluted steel deck roof assembly may be used. The roof assembly shall be constructed of the materials and in the manner described in the individual P700 Series Roof-Ceiling Design in the UL Fire Resistance Directory. The hourly rating of the roof assembly shall be equal to or greater than the hourly rating of the wall assembly. The roof assembly shall include the following construction features:

A. **Steel Roof Deck —** Max 3 in. deep galv steel fluted roof deck.

B. **Spray-Applied Fire Resistive Materials* —** (Not Shown) - Prior to the installation of the steel ceiling runners, Forming Material and Fill, Void or Cavity Material (Items 2A, 3A, 3B), the roof assembly shall be sprayed with the type and thickness of fire resistive material indicated in the individual P700 Series design.

GCP APPLIED TECHNOLOGIES INC — Type MK-6-HY

2. **Wall Assembly —** Min 8 in. thick steel reinforced lightweight or normal weight (100-150 pcf) structural concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***.

See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.

3. **Steel Angles —** Nom 5 in. by 3 in. by 12 MSG (or heavier) steel angles, max 12 in. long, staggered max 24 in. OC on opposite sides of wall with 3 in. leg fastened to fluted steel floor units or roof deck.

4. **Joint System — Max separation between bottom of floor units and top of concrete wall at time of installation is 3-1/2 in. The joint system is designed to accommodate a max 14 percent compression or extension from its installed width.** The joint system shall consists of the following:

A. **Forming Material* —** Nominal 4 in thick pieces of nominal 4 pcf forming material sized to attain a min compression rate of 50 percent in the thickness direction firmly packed to completely fill the flutes. Additional pieces of batt insulation, min 8 in. wide, shall be compressed 50 percent in thickness and installed edge first into joint opening between bottom of fluted floor or roof units and top of concrete wall.

THERMAFIBER INC — Type SAF

A1. **Forming Material*-Plugs —** (Optional-Not Shown) Performed mineral wool plugs, formed to the shape of the fluted floor units, friction fit to completely fill the flutes above the ceiling runner. The plugs shall be flush with both wall surfaces. Additional forming material, described in Item 3A, to be used in conjunction with the plugs to fill the gap between the top of the wall and the bottom of the steel floor units.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP777 Speed Plugs

B. **Fill, Void or Cavity Material* - Sealant —** A 1/8 in. wet thickness of fill material sprayed of trowled on each side of wall to completely cover mineral wool forming material and to overlap a min 1/2 in. onto steel angles, steel floor units and concrete wall. When spray-applied fire resistive material* is applied to the steel deck, the fill material is to overlap the steel angles and wall a min 1/2 in. and the spray-applied fire resistive material a min of 2 in. on both sides of the wall.

HILTI CONSTRUCTION CHEMICALS, DIV OF HILTI INC — CP672 Firestop Spray or CFS-SP WB Firestop Joint Spray

*** Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.**

Last Updated on 2010-06-07

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ASSEMBLY INDEX

BW-S-0002 1 or 2 hr BO GWB WALL

HW-D-0097 2 hr HO CMU WALL

HW-D-0225 2 hr HO CONC/CMU WALL

HW-D-0209 1 or 2 hr HO GWB WALL

HW-D-1044 2 hr HO CMU WALL

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
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AA-C002208
ALM FOR F.T.P. PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	NO SCALE

Drawing Title:

JOINT ASSEMBLY LISTING

BID DOCUMENTS

Drawing No.:

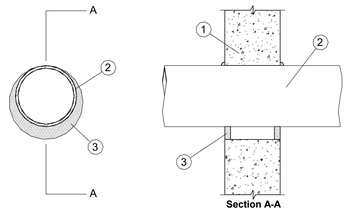
AL862

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

12/8/2020 5:56:10 PM

UL SYSTEM NO. W-J-1055

DECEMBER 9, 2008
F RATING — 2 HR
T RATING — 0 HR
L RATING AT AMBIENT - LESS THAN 1 CFM/SQ FT
L RATING AT 400 F - LESS THAN 1 CFM/SQ FT



1. **Wall Assembly -** Min 6 in. (152 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks***. Max diam of opening is 26 in. (660 mm).
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.
2. **Through Penetrant -** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe, conduit or tubing may be installed at an angle not greater than 45 degrees from perpendicular. The annular space between pipe, conduit or tubing and periphery of opening shall be min 0 in. (0 mm, point contact) to max 2 in. (51 mm). Pipe, conduit or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, conduit or tubing may be used:
   A. **Steel Pipe -** Nom 24 in. (610 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.
   B. **Iron Pipe -** Nom 24 in. (610 mm) diam (or smaller) cast or ductile iron pipe.
   C. **Conduit -** Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing, nom 6 in. (152 mm) diam (or smaller) steel conduit or nom 1 in. (25 mm) diam (or smaller) flexible steel conduit.
   D. **Copper Tubing -** Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing.
   E. **Copper Pipe -** Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.
3. **Fill, Void or Cavity Material* - Sealant -** Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with both surfaces of wall. At the point contact location between through penetrant and concrete, a min 3/8 in. (10 mm) diam bead of fill material shall be applied at the concrete/through penetrant interface on both surfaces of wall.
   SPECIFIED TECHNOLOGIES INC - SpecSeal Series SSS Sealant or SpecSeal LCI Sealant
   * Indicates such products shall bear the UL or cUL Certification Mark for jurisdictions employing the UL or cUL Certification (such as Canada), respectively.

ASSEMBLY INDEX

W-J-1055 2 hr CONC/CMU WALL

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
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AA-C002208
MLM JOB #: TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	NO SCALE

Drawing Title:

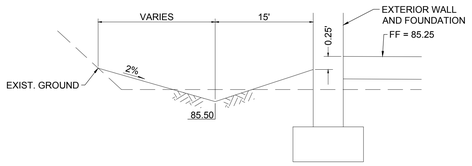
PENETRATION ASSEMBLY LISTING

BID DOCUMENTS

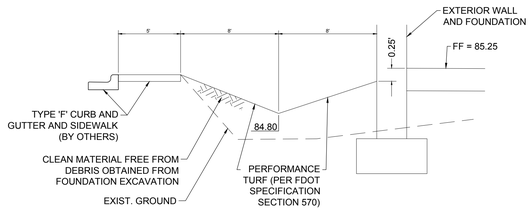
Drawing No.:

AL881

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt
12/8/2020 5:56:16 PM



SECTION C
N.T.S.



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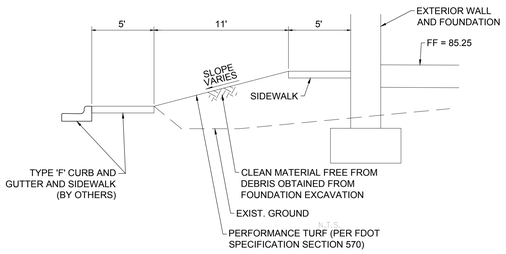
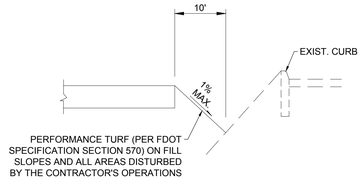


SECTION A
N.T.S.

NOTE:
ALL AREAS DISTURBED BY THE CONTRACTOR'S OPERATIONS SHALL BE TURFED IN ACCORDANCE WITH FDOT SPECIFICATION SECTION 570.



SECTION D
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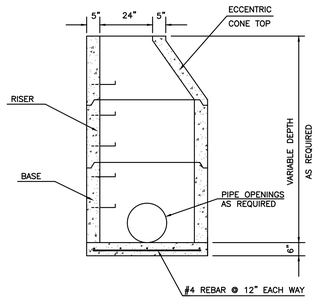
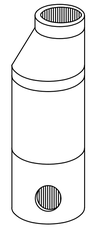
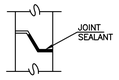




ISOMETRIC VIEW



JOINT DETAIL

NOTES:

1) STRUCTURE MAY BE CAST INPLACE OR PRECAST.

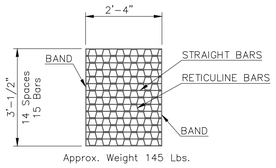
2) IF STRUCTURE DEPTH EXCEEDS 4'-6" METAL STEPS ARE TO BE PLACED ON WALL.

3) WALLS SHALL BE REINFORCED WITH WIRE MESH AT 0.2 IN. SQ./FT.

4) BOTTOM SLAB AND CAP SHALL BE REINFORCED WITH #4 REBAR AT 12" O.C. EACH WAY.

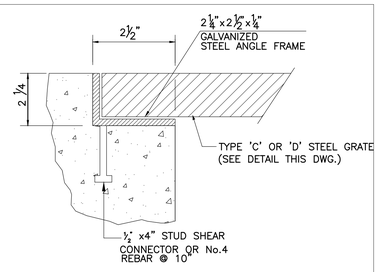
5) PROVIDE MANHOLE FRAME AND LID RATED FOR H-20 LOADING.

STANDARD MANHOLE DETA ILS
N.T.S.

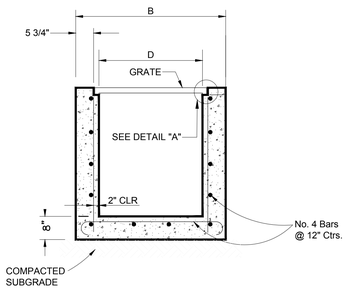


TYPE 'C' STEEL GRATE
N.T.S.
(U,S, FOUNDRY CAT NO. 6611 OR EQUAL)

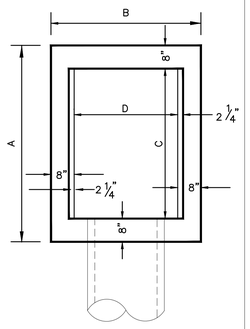
NOTE:
1. GRATES DIFFERING ONLY IN NON-ESSENTIAL DETAILS WILL BE ACCEPTABLE. STEEL GRATES SHALL BE GALVANIZED.



DETAIL 'A'
N.T.S.



SECTION VIEW
N.T.S.

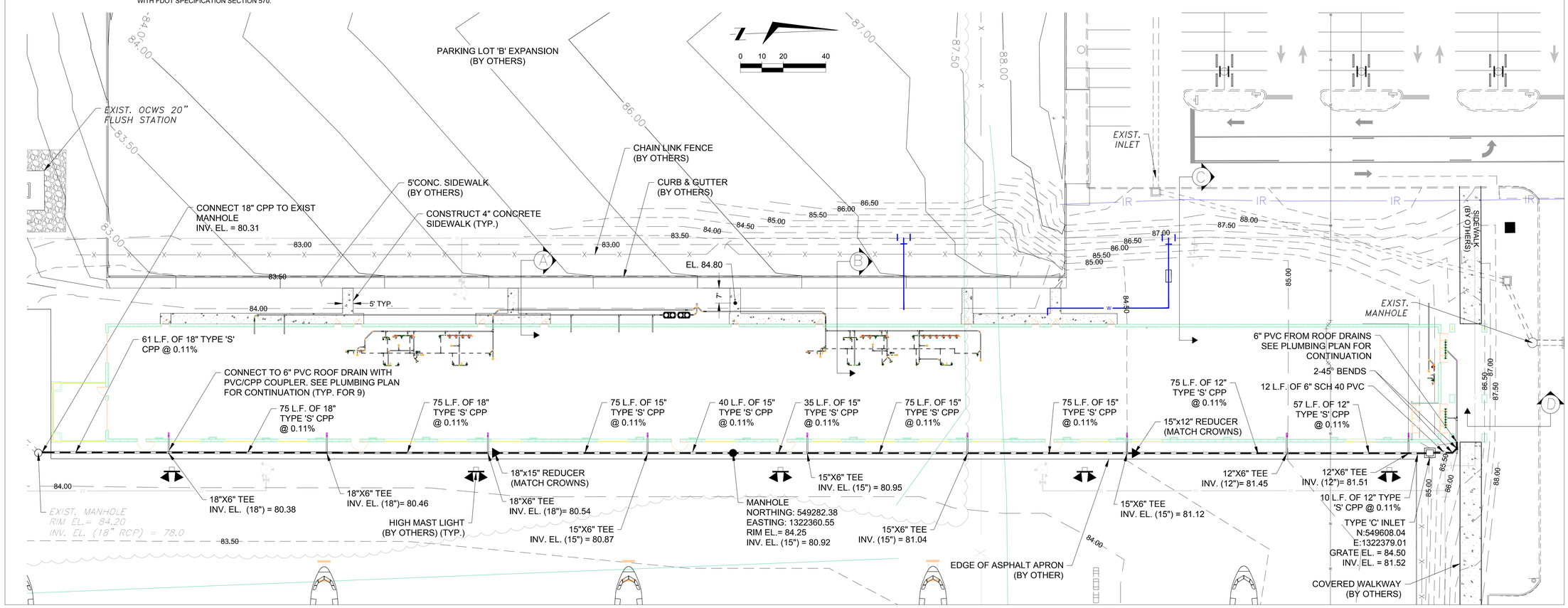


PLAN VIEW
N.T.S.

INLET DIMENSIONS				
	A	B	C	D
TYPE C	4'-5"	3'-4"	3'-1"	2'-0"

NOTE:
1. 8" WALL MAY BE REDUCED TO 6" FOR PRE-CAST UNITS.

TYPE 'C' INLET
N.T.S.



OKALOOSA COUNTY

FLY VPS

C19-2811-AP
Construction of Satellite Concourse 'C'

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WWW.MLM-MARTIN.COM

AA-C002208
MLM JOB # TYPE PROPERTY

JAMES N. GOODWIN LICENSE No. 40995 STATE OF FLORIDA PROFESSIONAL ENGINEER

SEAL

Revisions

No.	Date	Description

INFRASTRUCTURE CONSULTING & ENGINEERING
5550 WEST IDLEWILD AVE. SUITE 115
TAMPA, FLORIDA 33634 (813) 330-2701
CERTIFICATE OF AUTHORIZATION NO.: 30862

Project No.:	MLM-19672
Designed By:	JG
Drawn By:	MA, AM
Checked By:	DH
Issue Date:	30-NOV-2020
Drawing Scale:	1" = 20'-0"

Drawing Title:

DRAINAGE AND SIDEWALK PLAN

BID DOCUMENTS

Drawing No.:

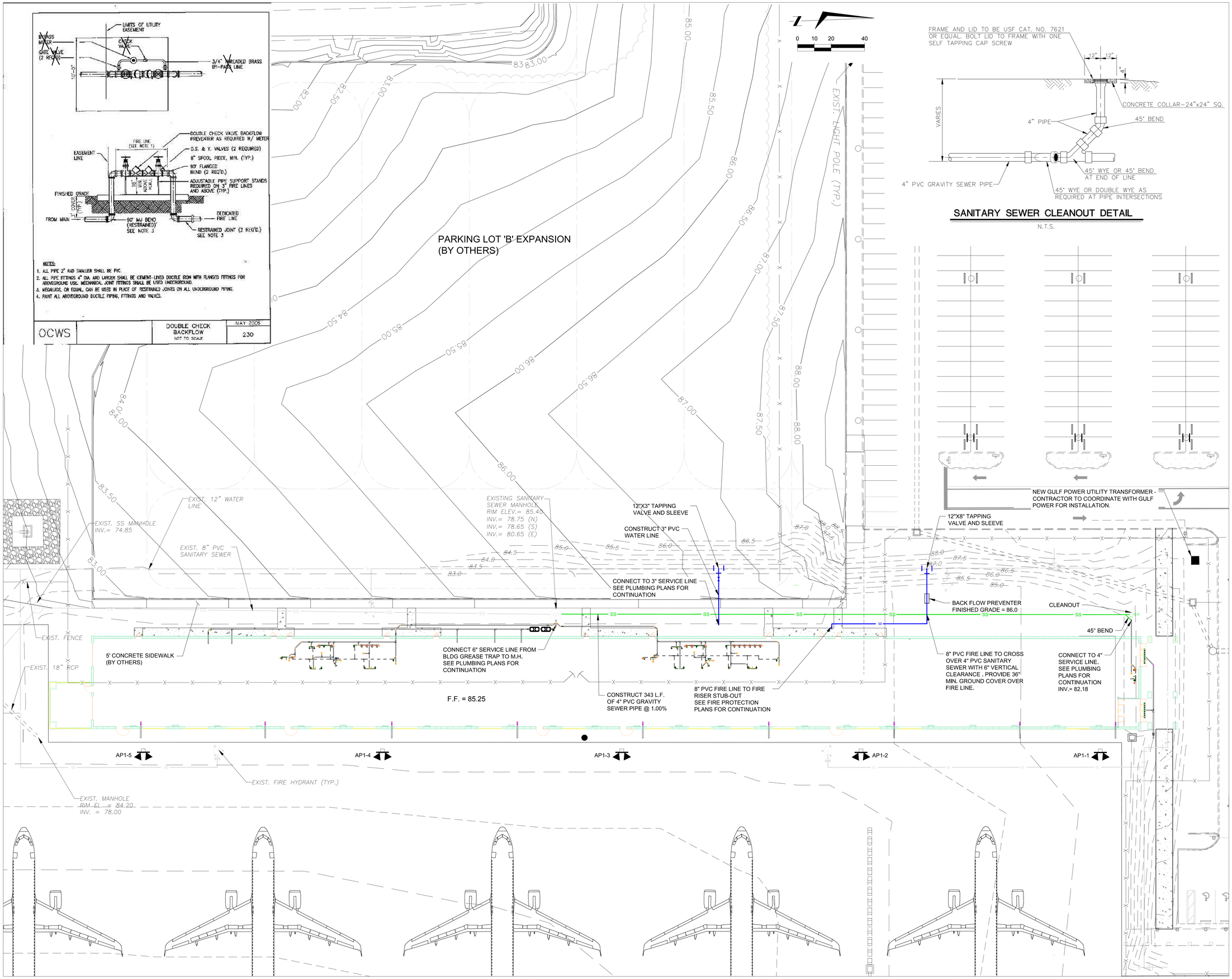
C100

NOTES:
1. ALL PIPE 2" AND SMALLER SHALL BE PVC.
2. ALL PIPE FITTINGS 4" DIA. AND LARGER SHALL BE CEMENT-LINED DUCTILE IRON WITH FLANGED FITTINGS FOR ABOVEGROUND USE. MECHANICAL JOINT FITTINGS SHALL BE USED UNDERGROUND.
3. MEGALUGS, OR EQUAL, CAN BE USED IN PLACE OF RESTRAINED JOINTS ON ALL UNDERGROUND PIPING.
4. PAINT ALL ABOVEGROUND DUCTILE PIPING, FITTINGS AND VALVES.

OCWS		DOUBLE CHECK BACKFLOW NOT TO SCALE	MAY 2006 230

SANITARY SEWER CLEANOUT DETAIL

N.T.S.



OKALOOSA COUNTY

FLY VPS

C19-2811-AP
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MLM JOB #: TYPE PROPERTY

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TAMPA, FLORIDA 33634 (813) 330-2701
CERTIFICATE OF AUTHORIZATION NO.: 30862

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Designed By:	JG
Drawn By:	MA, AM
Checked By:	DH
Issue Date:	30-NOV-2020
Drawing Scale:	1" = 20'-0"

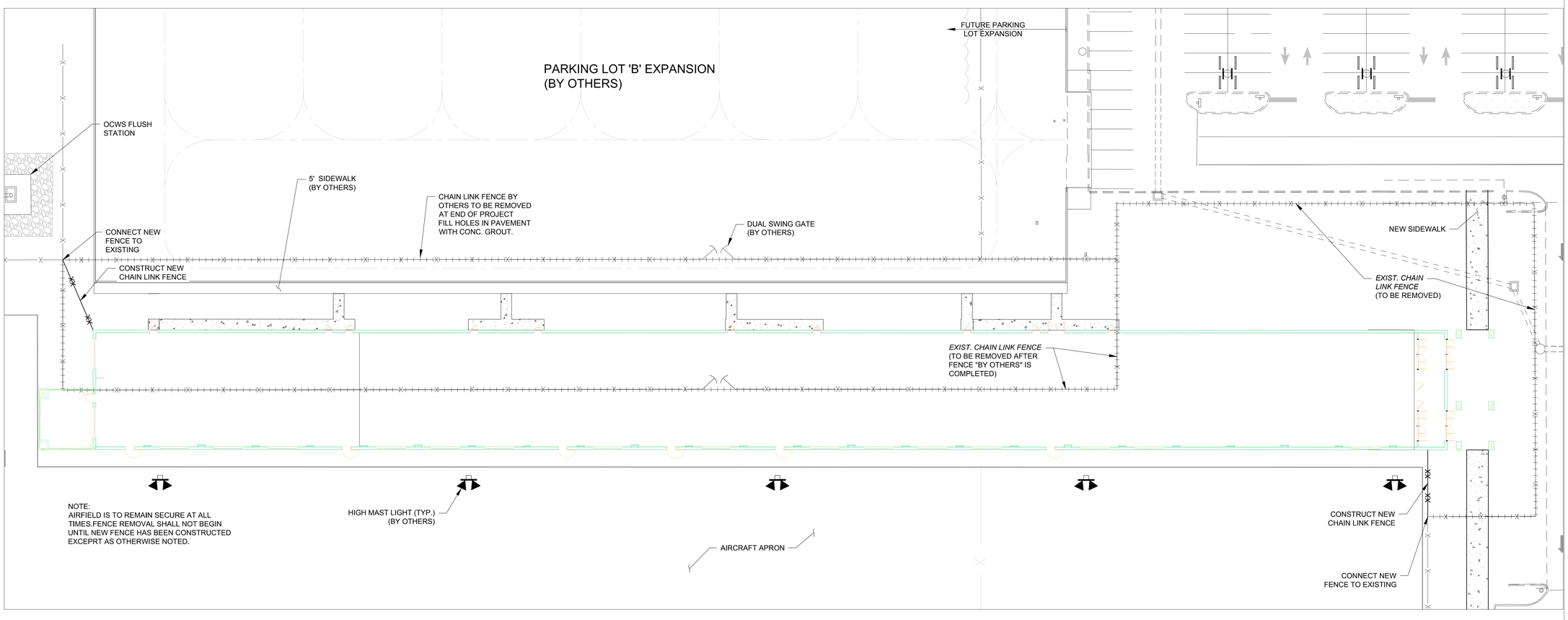
Drawing Title:

SITE UTILITIES PLAN

BID DOCUMENTS

Drawing No.:

C200



C19-2811-AP
Construction of Satellite Concourse 'C'

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MLM JOB # TYPE PROPERTY

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CERTIFICATE OF AUTHORIZATION NO.: 30862

Project No.:	**MLM-19672**
Designed By:	**JG**
Drawn By:	**MA, AM**
Checked By:	**DH**
Issue Date:	**30-NOV-2020**
Drawing Scale:	**1" = 20'-0"**

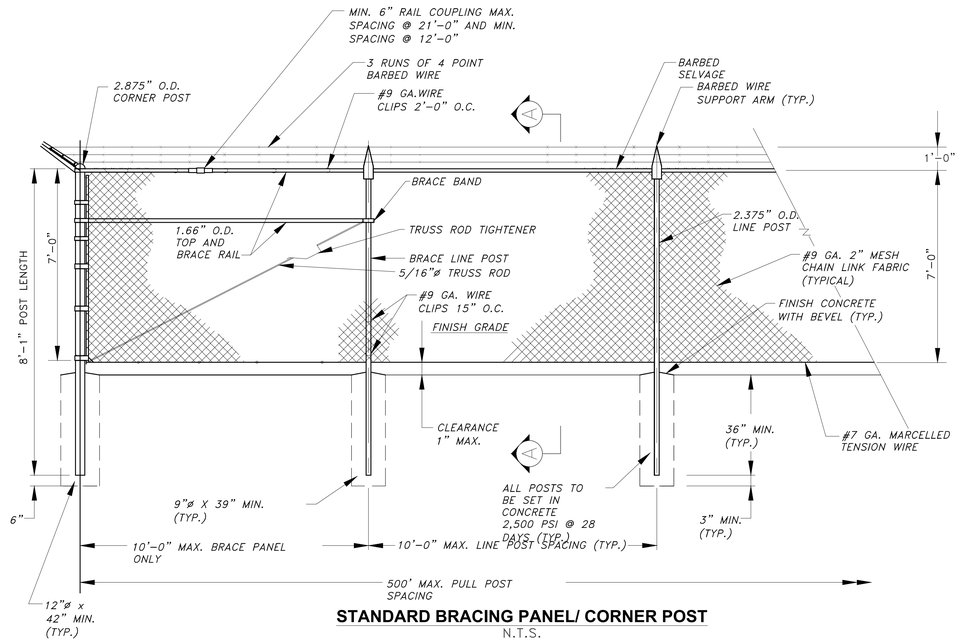
Drawing Title:

FENCING PLAN

BID DOCUMENTS

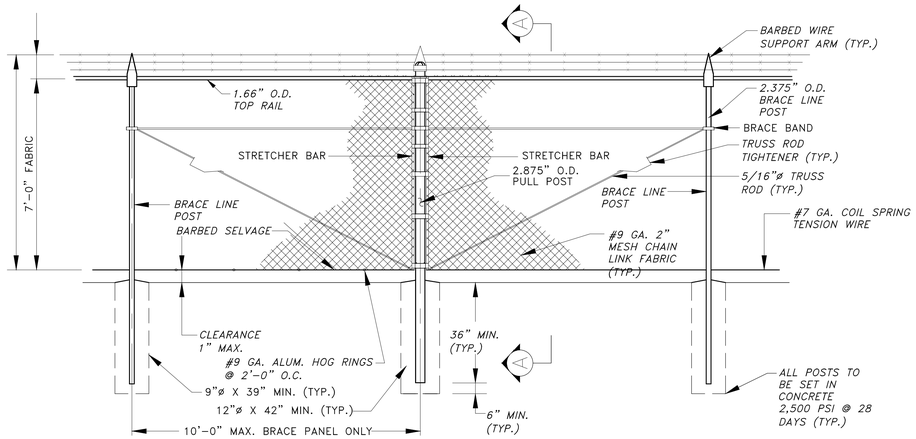
Drawing No.:

C300



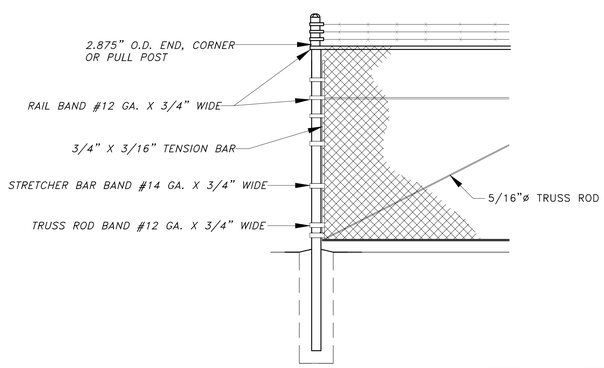
STANDARD BRACING PANEL/ CORNER POST

N.T.S.



STANDARD BRACING/ PULL POST PANEL

N.T.S.

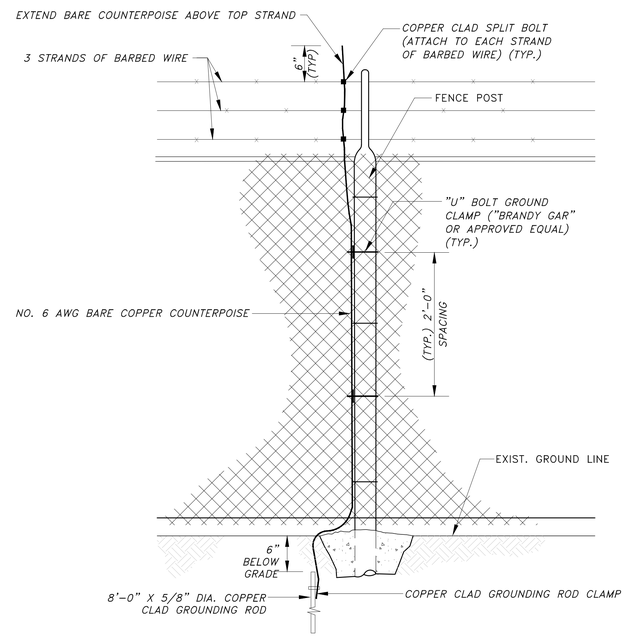


TERMINAL DETAIL

N.T.S.

NOTES:

1. ALL BACKFILL/EMBANKMENT MATERIAL, PLACEMENT AND COMPACTION REQUIRED TO MAINTAIN THE 1" MAXIMUM GAP BETWEEN FENCE AND GROUND AND TO BACKFILL AROUND CONCRETE POST BASES SHALL BE INCIDENTAL TO THE PAY ITEM FOR FENCING. NO ADDITIONAL PAYMENT SHALL BE MADE FOR EMBANKMENT.
2. AT LOCATIONS SHOWN IN THE PLANS OR WHERE DIRECTED BY THE ENGINEER, HIGH DENSITY POLYETHYLENE SLATS WOVEN THROUGH THE CHAIN LINK FABRIC SHALL BE INCLUDED. SLATS SHALL BE INDUSTRIAL QUALITY WITH ULTRAVIOLET INHIBITORS. SLATS SHALL BE INSTALLED VERTICALLY WITH EACH SLAT EXTENDING THE ENTIRE HEIGHT OF THE FABRIC AND SECURED FROM SLIDING DOWN. OWNER TO SELECT COLOR.
3. FOR TEMPORARY FENCE THE CONCRETE POST FOUNDATION AND TOP RAIL ARE NOT RQUIRED.



TYPICAL FENCE GROUNDING DETAIL

N.T.S.

FENCE ELECTRICAL GROUNDING NOTE:

1. ELECTRICAL GROUNDS SHALL BE CONSTRUCTED AT THE FOLLOWING LOCATIONS:

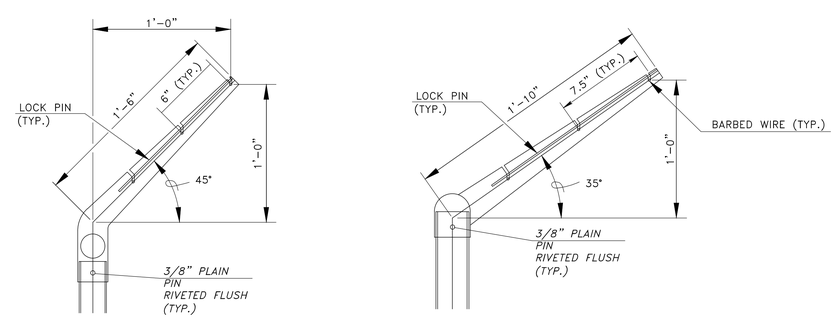
A) WHERE A POWER LINE PASSES OVER OR UNDER THE FENCE, THE GROUND SHALL BE INSTALLED DIRECTLY BELOW THE POINT OF CROSSING.

B) AT MAXIMUM 500-FOOT INTERVALS ALONG THE FENCE,

C) AT EACH GATE LEAF AND EACH GATE POST ON BOTH SIDES OF EACH GATE.

2. THE GROUND SHALL BE ACCOMPLISHED WITH A COPPER-CLAD ROD 8 FEET LONG AND A MINIMUM OF 5/8 INCH IN DIAMETER DRIVEN VERTICALLY UNTIL THE TOP IS 6 INCHES BELOW THE GROUND SURFACE. A NO. 6 SOLID COPPER CONDUCTOR SHALL BE CLAMPED TO THE ROD AND TO THE FENCE IN SUCH A MANNER THAT EACH ELEMENT OF THE FENCE IS GROUNDED.

3. INSTALLATION OF GROUND RODS SHALL NOT CONSTITUTE A PAY ITEM AND SHALL BE CONSIDERED INCIDENTAL TO THE LINE ITEM FOR FENCING.



NOTE: EXTENSION ARMS TO BE ANGLED OUTWARD AND AWAY FROM AIRFIELD SIDE OF FENCING (TYP.)

BARBED WIRE SUPPORT ARM DETAILS

N.T.S.

OKALOOSA COUNTY

FLY VPS

C19-2811-AP Construction of Satellite Concourse 'C'

668 N. ORLANDO AVE.
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MAITLAND, FL 32751

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WWW.MLM-MARTIN.COM

AA-C002208
MLM JOB # TYPE PROPERTY

JAMES N. GOODWIN LICENSED No. 40995 STATE OF FLORIDA PROFESSIONAL ENGINEER

SEAL

Revisions

No.	Date	Description

INFRASTRUCTURE CONSULTING & ENGINEERING
5550 WEST IDLEWILD AVE. SUITE 115
TAMPA, FLORIDA 33634 (813) 330-2701
CERTIFICATE OF AUTHORIZATION NO.: 30862

Project No.:	MLM-19672
Designed By:	JG
Drawn By:	MA, AM
Checked By:	DH
Issue Date:	30-NOV-2020
Drawing Scale:	1" = 20'-0"

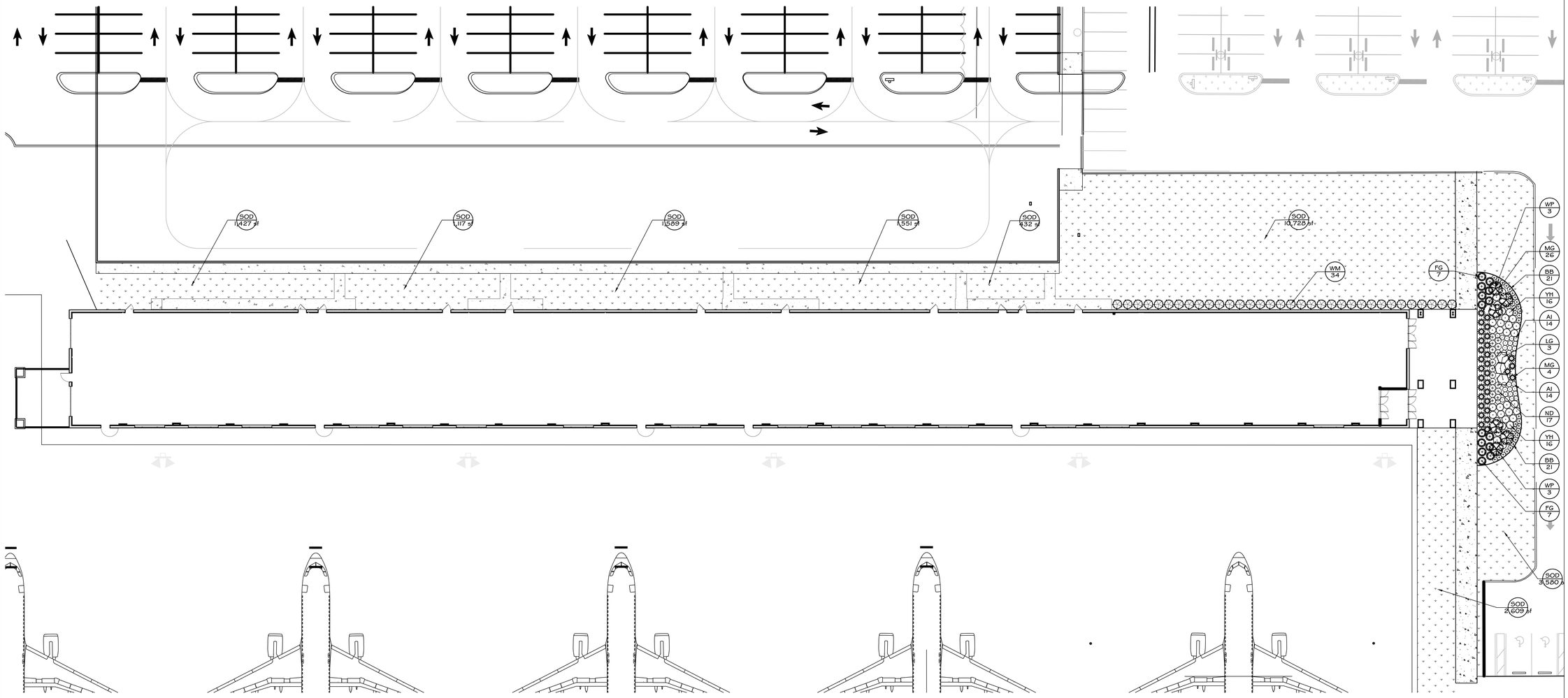
Drawing Title:

FENCING DETAIL

BID DOCUMENTS

Drawing No.:

C301



PLANTING NOTES:

SCOPE OF WORK:
THIS WORK SHALL CONSIST OF PERFORMING MINOR CLEARING AND GRUBBING AS NEEDED, SOIL PREPARATION, FINISH GRADING, TREE, SHRUB AND TURFGRASS INSTALLATION, INCLUDING ALL LABOR, MATERIALS, TOOLS, EQUIPMENT, TESTING AND ANY APPROVALS, WARRANTY, MAINTENANCE AND OTHER APPURTENANCES NECESSARY FOR THE COMPLETION OF THIS PROJECT. PLANTING INSTALLATION SHALL CONFORM AT MINIMUM TO THE DETAILS PROVIDED WITHIN THESE PLANS.

1. ALL PLANTING AREAS ADJACENT TO PAVEMENT SHALL HAVE A FINISH GRADE OF SOIL NO LESS THAN 1" BELOW THE TOP PAVEMENT/CURB.
2. THOROUGHLY ERADICATE AND SPRAY TO KILL EXISTING NATIVE GRASSES AND WEEDS. HAND GRUB AND THOROUGHLY RAKE ALL PROPOSED GROUND COVER AND GRASS AREAS AS NEEDED TO ERADICATE WEED ROOTS. REFER TO THE CLEARING, GRUBBING AND THE PREPARATION NOTES.
3. ALL PLANT MATERIAL IS SUBJECT TO BEING INSPECTED AND APPROVED BY THE OWNER'S REPRESENTATIVE. ALL GRADABLE NURSERY PLANTS SHALL BE FLORIDA #1 OR BETTER AS DESCRIBED IN "GRADES AND STANDARDS FOR NURSERY PLANTS", STATE OF FLORIDA LATEST EDITION. CONTAINER GROWN PLANTS: A MIN. OF 80% OF THE CONTAINER ROOTBALL MUST BE BOUND BY THE ROOT SYSTEM. ENCIRCLING OR "RING" ROOTS ARE PROHIBITED AND PLANTS WILL BE REJECTED.
- PLANTING SIZE DETERMINATION:SHADE TREES: HEIGHT SHALL BE MEASURED FROM THE CROWN OF THE ROOT BALL TO THE TOP OF MATURE GROWTH. SPREAD SHALL BE MEASURED TO THE END OF BRANCHING EQUALLY AROUND THE CROWN FROM THE CENTER OF THE TRUNK. MEASUREMENTS ARE NOT TO INCLUDE ANY TERMINAL GROWTH. SINGLE TRUNK TREES SHALL BE FREE OF "V" CROTCHES THAT COULD BE POINTS OF WEAK LIMB STRUCTURE OR DISEASE INFESTATION.
- SHRUBS: HEIGHT SHALL BE MEASURED FROM THE CROWN OF THE ROOT BALL TO THE AVERAGE HEIGHT OF THE TOP OF THE PLANT. SPREAD SHALL BE MEASURED TO THE END OF BRANCHING EQUALLY AROUND THE SHRUB MASS. MEASUREMENTS ARE NOT TO INCLUDE ANY TERMINAL GROWTH.
4. THE CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE A MINIMUM OF 7 BUSINESS DAYS PRIOR TO DELIVERY OF TREES AND SHRUBS SO THAT A REPRESENTATIVE MAY BE PRESENT TO VERIFY PLANT MATERIALS MEET FLORIDA NO. 1 STANDARDS. DOCUMENT CONFORMANCE PER SECTION 580-2.1.1 SIZES SPECIFIED IN THE PLANT LIST ARE MINIMUM SIZES TO WHICH THE PLANTS ARE TO BE JUDGED. FAILURE TO MEET MINIMUM SIZE ON ANY PLANT WILL RESULT IN REJECTION OF THAT PLANT. ALL PLANTS SHALL BE HEALTHY, VIGOROUS, WELL BRANCHED, FREE OF DISEASE, INSECT EGGS, AND LARVAE.AND SHALL HAVE ADEQUATE ROOT SYSTEMS.ALL CONTAINER GROWN MATERIAL SHALL BE HEALTHY, VIGOROUS, WELL-ROOTED PLANTS AND ESTABLISHED IN THE CONTAINER IN WHICH THEY ARE SOLD. THE PLANTS SHALL HAVE TOPS WHICH ARE GOOD QUALITY AND ARE IN A HEALTHY GROWING CONDITION.ALL ROOT BOUND PLANTS SHALL BE REJECTED
5. ALL MATERIALS SHALL BE WARRANTED THROUGH FINAL ACCEPTANCE OF PROJECT. COST OF WARRANTED MATERIALS SHALL BE INCLUDED IN THE UNIT PRICE OF THE MATERIAL UNLESS OTHERWISE INSTRUCTED AND INDICATED ON BID FORM.
6. NO SUBSTITUTIONS OF SPECIFIED PLANT MATERIALS WILL BE PERMITTED UNLESS APPROVED BY THE OWNERS REPRESENTATIVE LANDSCAPE ARCHITECT OR ASSIGNEES. IF ANY CHANGES ARE PROPOSED TO THE DESIGN (PLANT TYPES, SIZE, LOCATION OR SPACING, PLANT ARRANGEMENTS, BEDLINE DESIGN, ETC.) THE OWNER'S REP SHALL BE CONTACTED FOR APPROVAL.
7. LANDSCAPE CONTRACTOR SHALL WATER ALL TREES AND PLANTINGS BY HAND UNTIL PROJECT ACCEPTANCE. DEEP THOROUGH WATERING IS SUPERIOR TO SHALLOW WATERING SINCE IT PENETRATES DOWN TO THE ROOTING AREA. WATER SHALL BE PROVIDED BY THE LANDSCAPE CONTRACTOR WHO SHALL ALSO FURNISH EQUIPMENT AND HOSES IF NECESSARY FOR THOROUGH WATERING OF PLANT MATERIAL. AT THE TIME OF PLANTING ALL PLANT MATERIAL SHALL BE THOROUGHLY WATERED BY SOAKING THE ENTIRE PLANT PIT AREA (PLANT, ROOTBALL AND PLANTING BACKFILL) DURING PLANTING AND AGAIN AFTER BACKFILLING AND TAMPING OF ROOT BALL AREA AROUND EACH AND EVERY PLANT.
8. PLANTING BED PREPARATION:
a. STAKE LOCATIONS, LIMITS OF PLANTS AND PLANTING BEDS SHALL REFLECT PLANS TO THE GREATEST EXTENT POSSIBLE. COORDINATE WITH OWNER'S REPRESENTATIVE TO VIEW LAYOUT AND BED OUTLINES ONSITE. CONTRACTOR SHALL MAKE MODIFICATIONS AS MAY BE REQUESTED.
b. HERBICIDE APPLICATION: FOR PROPOSED TURF AREAS AND MULCH BED AREAS, BEGIN TURF SPRAYING PROCESS A MIN. OF 30 DAYS PRIOR TO PLANTING AS FOLLOWS: SPRAY AREAS TO BE KILLED WITH GLYPHOSATE PER MANUFACTURER'S RECOMMENDATIONS. 7 DAYS AFTER SPRAYING, CLOSE MOW TO 1" HEIGHT. 14 DAYS AFTER CLOSE MOWING, RE-SPRAY WITH GLYPHOSATE PER MANUFACTURER'S RECOMMENDATIONS. 7 DAYS AFTER RE-SPRAYING, PROCEED WITH TURF REMOVAL IN PROPOSED SOD AREAS. LEAVE KILLED TURF IN PLACE FOR PROPOSED MULCH BEDS. PROPOSED INDIVIDUAL TREE RINGS DO NOT REQUIRE HERBICIDE APPLICATION.
c. TURF AND OTHER MATERIAL SHALL BE THOROUGHLY REMOVED PRIOR TO THE PLANTING AND BACKFILL PROCESS.
d. EXCAVATE PLANTING PITS AT DIAMETER/SIZE DETAILED. THE DEPTH OF THE HOLE SHALL BE 2" SHALLOWER THAN THE ROOTBALL; THEN DIG DEEPER AROUND THE HOLE"S PERIMETER, CREATING A FIRM CENTRAL PLATEAU SO THAT EXCESS WATER WILL FLOW AWAY FROM ROOTBALL.
e. WHERE PLANTING BEDS ARE PROPOSED, CLEAR AND GRUB TO A MIN., DEPTH OF 4" AS NEEDED. REMOVE REMNANT PLANTS AND STUMPS/DEBRIS AS NEEDED. EXCAVATED MATERIAL SHALL BE REMOVED FROM THE SITE AND DISPOSED OF IN A LAWFUL MANNER.
f. PRE-EMERGENT HERBICIDE SHALL BE APPLIED TO ALL PLANTING BEDS. THE HERBICIDE ACTIVE INGREDIENTS SHALL BE SUITABLE FOR CONTROL OF ANNUAL AND PERENNIAL BROADLEAF WEEDS AND GRASSES. THE HERBICIDE SHALL BE APPLIED BY HAND PER MANUFACTURER'S RECOMMENDATIONS FOR APPLICATION METHOD, TIMING AND APPLICATION RATE SHALL BE STRICTLY ADHERED TO.
g. PLACE THE ROOTBALL ON THE PLATEAU, MAKING SURE IT IS 2" HIGHER THAN THE SURROUNDING SOIL.
h. FILL IN PLANTING PIT WITH BLENDED SOIL BACKFILL MIXTURE. SEE THIS SHEET FOR SPECIFICS AND REQUIREMENTS.
i. FILL AND TAMP LIGHTLY AROUND EACH AND EVERY PLANT. FLUSH WITH WATER AND MAKE ADJUSTMENTS TO PROVIDE PROPERLY SET PLANT MATERIAL WITH THE TOP OF THE ROOTBALL EVEN WITH FINISHED GRADE AND WITH ROOT FLARE 1" ABOVE GRADE FOR TREES. INSTALL FERTILIZER PER MANUFACTURER RECOMMENDATIONS.
j. BUILD SAUCER TO CONTAIN WATER AROUND EACH PLANTING PIT. REMOVE EXCESS EXCAVATED SOIL FROM THE SITE.
k. ESTABLISH FINISHED PRE-MULCHED GRADE.
l. SPREAD PINE STRAW ACROSS ENTIRE BED TO A DEPTH OF 3". PINE STRAW SHALL BE FRESH SLASH OR LONGLEAF PINE STRAW. SHRUB BEDS AND TREE RINGS SHALL HAVE A 3"-4" STRAW DEPTH AFTER MANICURE AND COMPACTION; 1" AT CURB- PAVEMENT EDGES.
9. m. PROPOSED SOD AREAS SHALL BE RAKED SMOOTH. SPREAD TOPSOIL (AVG. 2" DEPTH) ACROSS PROPOSED SOD AREAS TO ESTABLISH PRE-FINISHED GRADE. PLACE SOD WITH STAGGERED JOINTS AND SEAMS TIGHTLY BUTTED TOGETHER PEG IN PLACE WHERE MOVEMENT OR SLIPPAGE IS A CONCERN.
10. MULCH - SHALL BE FRESH SLASH OR LONGLEAF PINE STRAW. SHRUB BEDS AND TREE RINGS SHALL HAVE 3" PINE STRAW DEPTH AFTER MANICURE AND COMPACTION; 1" AT CURB. TAMP EDGES DOWN WITH FOOT OR HAND TAMPER.
11. "BLENDED SOIL" SHALL CONSIST OF ⅓ MUSHROOM COMPOST OR PEAT, ⅓ COMPOSTED COW MANURE AND ⅓ COMPOSTED BARK.
12. PLANTING BACKFILL MIXTURE FOR TREES AND SHRUBS/GRASSES SHALL CONSIST OF 30% "BLENDED SOIL AND 70% EXISTING SOIL. ALL PLANTING BACKFILL MIXTURES ARE SUBJECT TO OWNER'S REPRESENTATIVE APPROVAL. MIX THOROUGHLY PRIOR TO INSTALLATION. SOIL REQUIRED SHALL BE PROVIDED BY THE CONTRACTOR. CONTRACTOR MUST LOAD, HAUL, AND SPREAD ALL TOPSOIL AND ANY OTHER SOIL ADDITIVES AS REQUIRED.
13. WHERE TREES ARE PLANTED IN ROWS OR LIKE-KIND GROUPS, THEY SHALL BE UNIFORM IN SIZE AND SHAPE.SHRUB MASSES AND GROUNDCOVERS SHALL BE TRIANGULARLY SPACED AT SPACING SHOWN ON PLANTING PLANS.
14. GROUPS OF SHRUBS SHALL BE PLACED IN A CONTINUOUS MULCH BED WITH SMOOTH CONTINUOUS LINES. ALL MULCHED BED EDGES SHALL BE CURVILINEAR IN SHAPE FOLLOWING THE CONTOUR OF THE PLANT MASS. TREES LOCATED WITHIN FOUR FEET OF SHRUB BEDS SHALL SHARE SAME MULCH BED.
15. ALL PLANT MATERIAL SHALL BE SPACED AND LOCATED PER PLAN. IF CONFLICTS ARISE BETWEEN ACTUAL SIZE OF AREA AND PLANS, CONTRACTOR SHALL CONTACT LANDSCAPE ARCHITECT FOR RESOLUTION. FAILURE TO MAKE SUCH CONFLICTS KNOWN TO THE OWNER OR LANDSCAPE ARCHITECT. FAILURE TO NOTIFY OF CONFLICTS SHALL RESULT IN CONTRACTOR'S LIABILITY TO RELOCATE MATERIAL.
16. CONTRACTOR TO SLIGHTLY ADJUST PLANT LOCATIONS IN THE FIELD AS NECESSARY TO BE CLEAR OF DRAINAGE SWALES AND UTILITIES. FINISHED PLANTING BEDS SHALL BE GRADED SO AS TO NOT IMPEDE DRAINAGE AWAY FROM BUILDINGS. IF SIGNIFICANT RELOCATIONS ARE REQUIRED, CONTRACTOR SHALL CONTACT LANDSCAPE ARCHITECT FOR RESOLUTION. FAILURE TO MAKE SUCH RELOCATIONS KNOWN TO THE OWNER OR LANDSCAPE ARCHITECT WILL RESULT IN CONTRACTOR'S LIABILITY OF PLANT MATERIALS.
17. IF ANY PLANT MORTALITY OCCURS DURING PROJECT INSTALLATION, DEAD PLANTS ARE TO BE REMOVED FROM THE JOB BY THE CONTRACTOR WEEKLY. CONTRACTOR SHALL MAINTAIN AN UPDATED, COMPREHENSIVE LIST OF ALL DEAD MATERIALS REMOVED AND PRESENT A COPY OF THE LIST TO THE OWNER AND OWNER'S REPRESENTATIVE AT THE END OF EVERY MONTH DURING THE CONTRACT PERIOD.
18. CONTRACTOR SHALL SUPPLY AMENDMENTS AND FERTILIZERS AS APPROPRIATE TO ENSURE PROPER ESTABLISHMENT AND THRIVING GROWTH OF PLANT MATERIAL.

GENERAL NOTES:

1. PLANS ARE INTENDED TO DEPICT THE RLA DESIGNER'S BEST DESIGN INTENT AND KNOWN SITE CONDITIONS. SOME MINOR ADJUSTMENTS MAY BE REQUIRED. IF FIELD ADJUSTMENTS ARE REQUIRED, CONTRACTOR SHALL NOTIFY OWNERS REPRESENTATIVE AND RECEIVE APPROVAL AND SUBSEQUENTLY ACCURATELY RECORD ADJUSTMENTS AND QUANTITIES ON AS-BUILT PLANS.
2. CONTRACTOR SHALL NOTIFY THE OWNER'S REPRESENTATIVE IMMEDIATELY OF ANY UNFORESEEN SITE CONDITIONS. (COMPACTED SOIL/SUBGRADE, DEBRIS, ROADWAY BASE, MATERIALS, POOR DRAINAGE, UTILITY CONFLICTS, ETC.) PRIOR TO PROCEEDING WITH LANDSCAPE INSTALLATION.
3. ANY PUBLIC LAND CORNER WITHIN THE LIMITS OF CONSTRUCTION IS TO BE PROTECTED. IF A CORNER MONUMENT IS IN DANGER OF BEING DESTROYED AND HAS NOT BEEN PROPERLY REFERENCED, THE CONTRACTOR SHOULD NOTIFY THE GENERAL CONTRACTOR AND OWNERS REPRESENTATIVE.
4. ALL AREAS OUTSIDE THE CONSTRUCTION LIMITS THAT ARE DAMAGED OR DISTURBED BY THE LANDSCAPE CONTRACTORS OPERATIONS SHALL BE REPAIRED OR REPLACED BY THE LANDSCAPE CONTRACTOR AT THEIR EXPENSE.
5. THE CONTRACTOR SHALL NOT BRING ANY HAZARDOUS MATERIALS ONTO THE PROJECT. THE CONTRACTOR SHALL NOT DISTURB OR STORE MATERIALS OR EQUIPMENT ON ANY WETLANDS, NATURAL ECOSYSTEM AREAS, OR WITHIN THE DRIPLINE OF EXISTING TREES.
6. THE CONTRACTOR SHALL RESTRICT PERSONNEL, THE USE OF EQUIPMENT AND THE STORAGE OF MATERIALS TO AREAS WITHIN THE LIMITS OF CONSTRUCTION. ANY OFF-SITE STORAGE AREA WILL REQUIRE PRIOR APPROVAL BY THE OWNER'S REPRESENTATIVE.
7. CONTRACTOR SHALL NOT CAUSE CONDITIONS OF EROSION OR SEDIMENTATION DISCHARGE ON ROADWAY AT ANY TIME DURING CONSTRUCTION.
8. PRODUCT SAMPLES AND DATA SHEETS SHALL BE SUBMITTED FOR ALL PROPOSED MATERIALS, INCLUDING BUT NOT LIMITED TO STAKING AND BRACING KITS, MYCORRHIZAL SOIL INOCULANT, CO-POLYMERS, FERTILIZER, PINE STRAW MULCH, TOPSOIL AND BLENDED SOIL FOR REVIEW AND APPROVAL BY THE OWNER'S REPRESENTATIVE PRIOR TO DELIVERY TO SITE.
9. SUBMITTALS AND NOTIFICATIONS:
A. PLANT MATERIAL DELIVERY--CORRESPOND VIA EMAIL
B. UNFORESEEN SITE CONDITIONS--CORRESPOND VIA EMAIL
C. TREE CERTIFICATIONS--FROM NURSERY ASSURING CULTIVAR AND SPECIES-- CORRESPOND VIA EMAIL
D. PRODUCT SAMPLES (MULCH, FERTILIZER, HERBICIDE, ADDITIVES) ETC.-- CORRESPOND VIA EMAIL
E. BACKFILL BLENDED SOIL MIXTURE ANALYSIS (COORDINATE WITH OWNER)
F. TREE STAKING MATERIALS (NOT REQUIRED)
10. ALL AREAS INADVERTENTLY DISTURBED AND NOT SPECIFICALLY DESIGNATED ON PLANS, SHALL BE RE-PLANTED AT THE EXPENSE OF THE CONTRACTOR. ALL DAMAGED AND/OR DISTURBED AREAS SHALL BE RESTORED TO PREVIOUS CONDITIONS OR BETTER. ANY DISTURBED AREAS TO RECEIVE TURF SHALL BE SMOOTHLY GRADED AND FIRM WITH POSITIVE DRAINAGE PRIOR TO THE INSTALLATION OF SOD.
11. THE CONTRACTOR IS REQUIRED TO COMPLY WITH THE STATE OF FLORIDA EROSION AND SEDIMENT CONTROL MANUAL. THE COST OF EROSION CONTROL SHALL BE INCLUDED IN THE COST OF THE PROJECT.
12. ALL CONTRACTORS SHALL BE REQUIRED TO COMPLETELY REMOVE ALL TRASH, DEBRIS AND EXCESS MATERIALS FROM THE WORK AREA AND THE PROPERTY (ESPECIALLY AT ALL CURB, GUTTERS AND SIDEWALKS) DAILY DURING INSTALLATION.
13. CONTRACTOR SHALL HAND MIX COPOLYMERS INTO THE BOTTOM ⅓ OF PLANTING PIT AND MYCHORRIZAL INOCULANTS IN THE TOP 3 INCHES OF SOIL AND INSTALL PRIOR TO MULCHING. CONTRACTOR IS NOT PERMITTED TO USE PRE-PACKAGED MIXES. PRODUCTS MUST BE SEPARATE.

PLANT SCHEDULE

TREES	CODE	QTY	BOTANICAL NAME	COMMON NAME	SIZE	CONTAINER
	WP	6	Trachycarpus fortunei	Windmill Palm	3`,4`,5` Varied Hts.	30 Gallon

SHRUBS	CODE	QTY	BOTANICAL NAME	COMMON NAME	SIZE	CONTAINER
	BB	42	Bulbine frutescens `Orange`	Orange Stalked Bulbine	12" Ht. x 6" Sprd.	1 Gallon
	AI	28	Dietes iridioides	African Iris	12" Ht. x 6" Sprd.	1 Gallon
	YH	32	Ilex vomitoria `Schillings Dwarf`	Dwarf Yaupon Holly `Schillings`	18"-21" Min. Ht. & Sprd.	3 Gallon
	LG	3	Ligustrum japonicum	Japanese Ligustrum `Treeform`	4`-5` Min. Ht & Sprd.	15 gal.
	MG	30	Muhlenbergia capillaris	Pink Muhly Grass	12"-15" Min. Ht. & Sprd.	1 Gallon
	WM	34	Myrica cerifera	Wax Myrtle	36" Ht. x 24" Sprd.	7 Gallon
	ND	17	Nandina domestica `Fire Power`	Firepower Nandina	12"x12"	3 Gallon
	FG	14	Tripsacum dactyloides nana	Dwarf Fakahatchee Grass	12"-15" Min. Ht. & Sprd.	1 Gallon

GROUND COVERS	CODE	QTY	BOTANICAL NAME	COMMON NAME	SIZE	CONTAINER
	SOD	23,035 sf	Eremochloa ophiuroides	Centipede Sod	---	

UTILITY NOTES:

1. THE LOCATION OF UNDERGROUND FACILITIES SHOWN IN THE PLANS IS BASED UPON INFORMATION PROVIDED BY OTHERS AT THE TIME OF THE PLANS PREPARATION, LOCATIONS SHOWN ARE APPROXIMATE, AND THIS INFORMATION SHOULD NOT BE ASSUMED TO BE COMPREHENSIVE.
2. THE LOCATIONS OF THE OVERHEAD UTILITIES SHOWN ON THE PLANS ARE BASED ON AVAILABLE INFORMATION AT THE TIME OF PLANS PREPARATION AND SHOULD BE FIELD VERIFIED.
3. THE CONTRACTOR SHALL COORDINATE WITH GENERAL CONTRACTOR AND/OR ALL UTILITY COMPANIES (VIA SUNSHINE ONE CALL) PRIOR TO CONSTRUCTION AND NO UTILITY SHALL BE RELOCATED. RATHER, THE PROPOSED PLANTING LOCATIONS SHALL BE ADJUSTED TO ACCOMMODATE THE EXISTING UTILITY. THE OWNERS REPRESENTATIVE SHALL NEGOTIATE ANY UTILITY CONFLICTS.
4. THE LANDSCAPE CONTRACTOR SHALL VERIFY AND MAINTAIN THE VISIBLE LOCATION OF ALL UTILITIES DURING CONSTRUCTION. ALL EXCAVATION WITHIN 5 FT. OF UTILITIES SHALL BE DONE BY HAND. MAINTAIN SURFACE MARKINGS, FLAGS, ETC. OF UTILITY LOCATIONS, RE-LOCATE IF NEEDED. RECORD ACCURATELY ON AS-BUILT DRAWINGS WHEN NEAR PROJECT COMPONENTS.

DHM Melvin Engineering
4428 LAFAYETTE STREET
MARIANNA, FLORIDA 32446
PHONE (850) 482-3045

OKALOOSA COUNTY

FLY VPS

C19-2811-AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
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MLM JOB #: TYPE PROPERTY

L. ALICIA HICKS-COON, RLA
FLORIDA LICENSE NO. 6667469

REGISTERED LANDSCAPE ARCHITECT
LAURA ALICIA HICKS-COON
LA 6667469
STATE OF FLORIDA
SEAL

Revisions

No.	Date	Description

INFRASTRUCTURE CONSULTING & ENGINEERING
5550 WEST IDLEWILD AVE. SUITE 115
TAMPA, FLORIDA 33634 (813) 330-2701
CERTIFICATE OF AUTHORIZATION NO.: 30862

Project No.:	MLM-19672
Designed By:	AHC
Drawn By:	AHC
Checked By:	BLB
Issue Date:	30-NOV-2020
Drawing Scale:	1" = 20'-0"

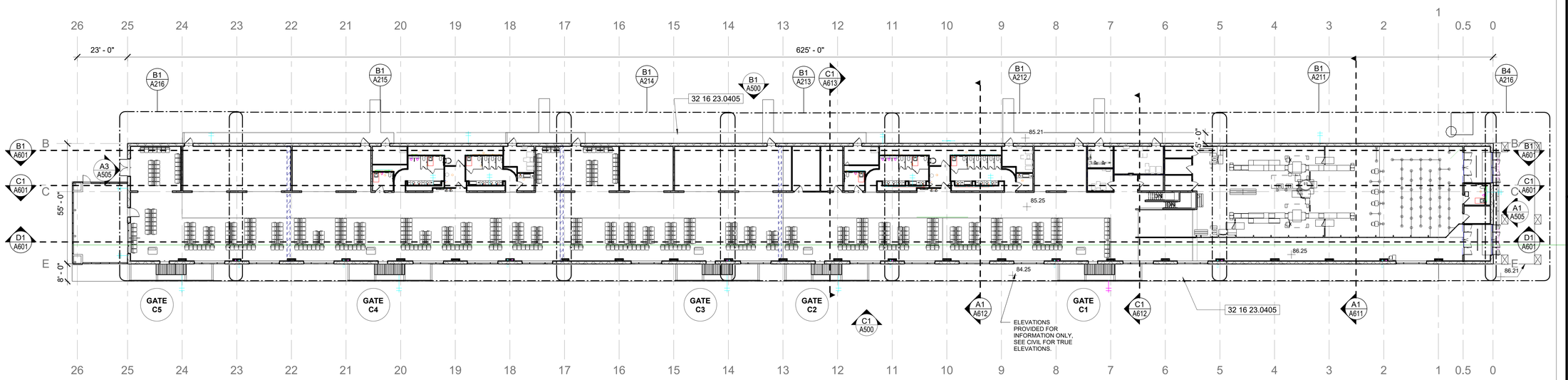
Drawing Title:

LANDSCAPE PLAN

BID DOCUMENTS

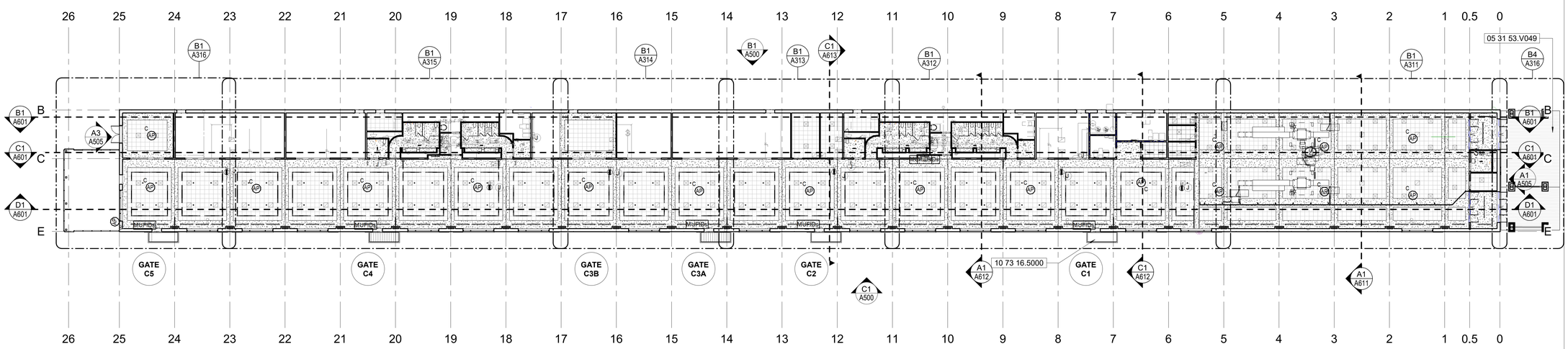
Drawing No.:

L100



D1 OVERALL PLAN CONCOURSE LEVEL
1" = 20'-0"

NORTH



A1 OVERALL CEILING PLAN CONCOURSE LEVEL
1" = 20'-0"

NORTH

KEYNOTES

NO.	
05 31 53.V049	TYP. 4" DOVETAIL G-90 GALV. STEEL ARCHITECTURALLY EXPOSED DECK. BASIS OF DESIGN: EPIC TORIS 4 - CANOPY.
10 73 16.5000	TYP. PREMANUFACTURED ALUMINUM CANOPY SYSTEM. PROVIDE SIGNED & SEALED CALCULATIONS/SHOPDRAWINGS COMPLYING W/ STRUCTURAL DESIGN LOADS.
32 16 23.0405	TYP. 4" BROOM FINISHED CONCRETE SIDEWALK.

SCALE: 1" = 20'-0"
0 5' 10' 20' 40'

OKALOOSA COUNTY

FLY VPS

C19-2811- AP Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
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AA-C002208
MLM JOB #: TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	1" = 20'-0"

Drawing Title:

OVERALL CONCOURSE PLANS

BID DOCUMENTS

Drawing No.:

A110

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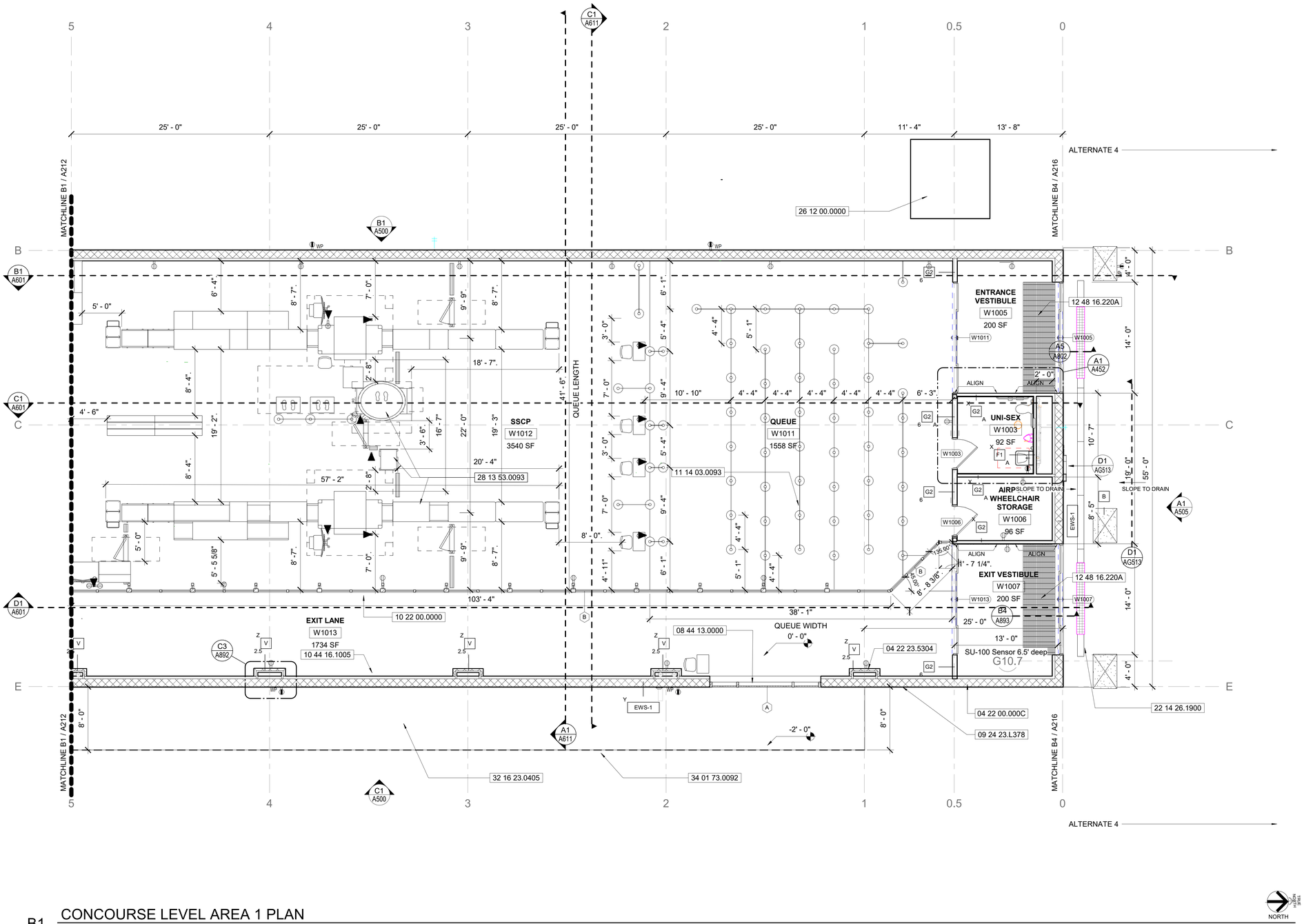


B1 CONCOURSE LEVEL AREA 1 PLAN

3/16" = 1'-0"

KEYNOTES

NO.	
04 22 00.000C	TYP. 12" NOMINAL CONCRETE MASONRY UNIT
04 22 23.5304	TYP. 4" BURNISHED CONCRETE MASONRY UNIT
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
10 22 00.0000	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY.
10 44 16.1005	TYP. RECESSED WALL CABINENT MOUNTED MULTI-PURPOSE (ABC CLASS) FIRE EXTINGUISHER.
11 14 03.0093	RETRACTABLE BELT STANCHION, NIC.
12 48 16.220A	TYP. 5/8" SS 304 WALKOFF ENTRY MAT.
22 14 26.1900	TYP. FACILITY STORM TRENCH DRAIN, SEE PLUMBING.
26 12 00.0000	TYP. AREA RESERVED FOR UTILITY TRANSFORMER, REF CIVIL AND ELEC.
28 13 53.0093	SECURITY ACCESS, METAL DETECTORS, X-RAY, EXPLOSIVE DETECTION, BAGGAGE AND PASSANGER SCREENING EQUIPMENT, NIC CONTRCTOR TO COORDINATE POWER AND DATA REQUIREMENTS.
32 16 23.0405	TYP. 4" BROOM FINISHED CONCRETE SIDEWALK.
34 01 73.0092	TYP. PRESERVE EDGE OF AIRFIELD CONSTRUCTION. COORDINATE PROTECTION OF BUILT ELEMENTS WITH ADJACENT PROJECT.

NOTES

1. REFER TO **AL841** FOR PARTITION TYPES
2. ALL PARTITIONS ARE DIMENSIONED FROM FACE OF FINISH TO FACE OF FINISH U.O.N.
3. ALL WALL PARTITIONS TO BE FULL HEIGHT U.O.N.
4. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE.
5. MAINTAIN 1/16" SLOPE MINIMUM AND 1/4" SLOPE MAXIMUM TO AREA DRAINS
6. FOR FIRE EXTINGUISHER DETAILS REFER TO **AL710**
7. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET SERIES **A711**
8. HINGE DOORS SIDE OF DOORS TO BE LOCATED PER DETAILS FROM FACE OF ADJACENT PERPENDICULAR PARTITIONS U.O.N.
9. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
10. FOR RAILING DETAILS REFER TO SHEET **A865**
11. REFER TO **AF** SERIES SHEETS FOR FINISH INFORMATION.
12. SHOP-APPLIED GALVANIZATION FOR METAL. TOUCH UP ALL DAMAGED GALVANIZATION WITHIN 24HRS OF ERECTION
13. CONTRACTOR TO PROVIDE SIGNED AND SEALED DRAWINGS AND LOAD CALCULATIONS IN COMPLIANCE WITH FLORIDA BUILDING CODE WITH SUPPLEMENTS FOR ALL FABRICATED STAIRS, LADDERS, GRAB BARS, GUARDS, HANDRAILS AND/OR PLATFORMS. MINIMUM 50 PLF AND 200 POUND CONCENTRATED DESIGN LOADS.
14. AREA DESIGNATED FOR FUTURE WORK (NIC). CONTRACTOR SHALL KEEP THIS AREA CLEAR OF ANY BUILT ELEMENTS ABOVE AND/OR BELOW GROUND UNLESS OTHERWISE NOTED WITHIN THE SCOPE OF THIS PROJECT.
15. CONCESSION AREAS SHALL BE FIT OUT AS SHELL SPACES WITH CODE MINIMUM SYSTEMS SUPPORT AS INDICATED.

LIFE SAFETY LEGEND

RATED FIRE PARTITIONS
1 = 1 HOUR FIRE PARTITION
2 = 2 HOUR FIRE PARTITION

SCALE: 3/16" = 1'-0"
0 16" 32" 64" 128"

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
SUITE 107
MAITLAND, FL 32751
407.897.6764 (VOICE)
407.894.1338 (FAX)
WWW.MLM-MARTIN.COM
AA-C002208
ALM 308-F TYPE PROPERTY
MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED FLOOR PLAN - AREA 1

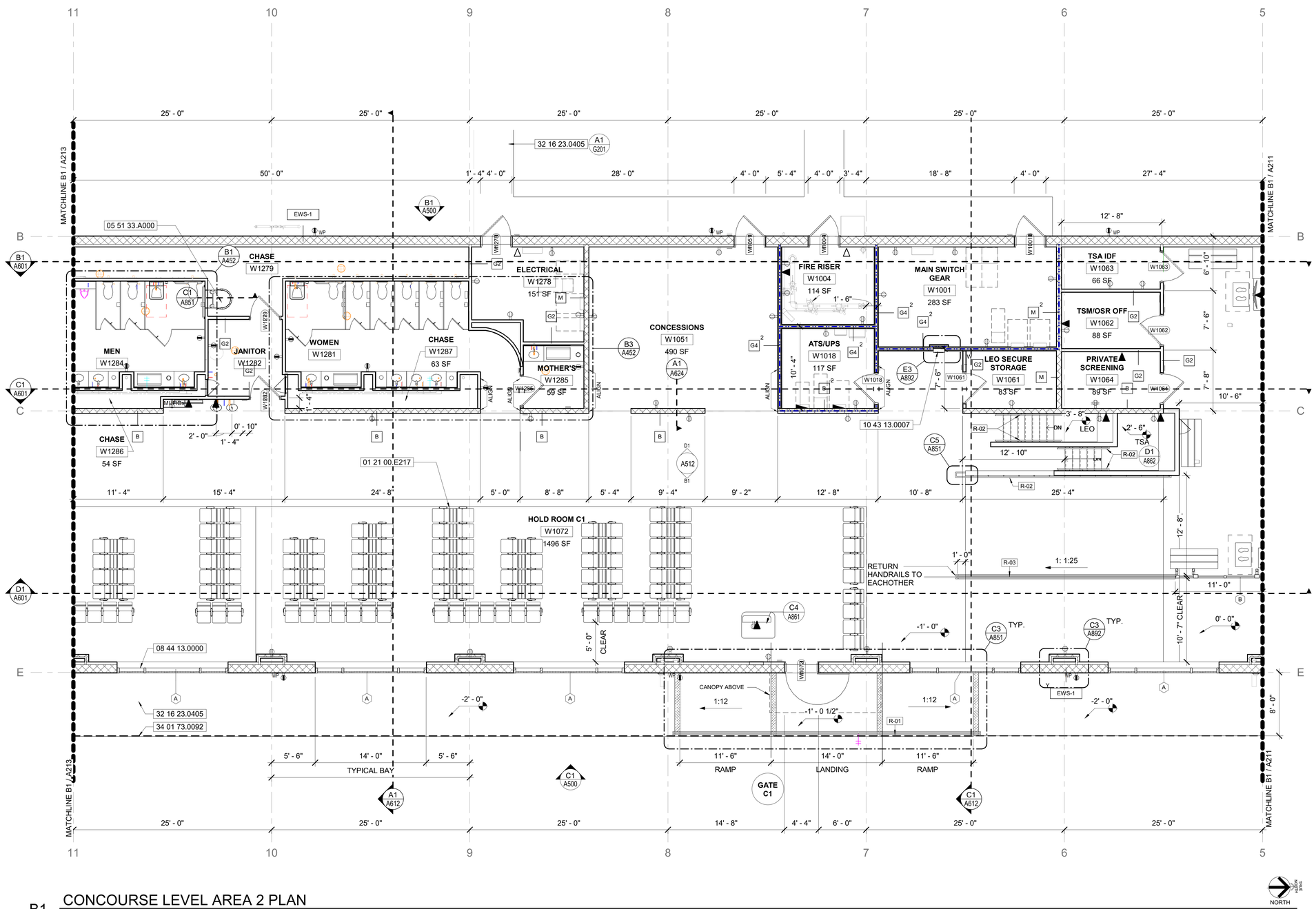
BID DOCUMENTS

Drawing No.:

A211

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

12/8/2020 5:34:47 PM



B1 CONCOURSE LEVEL AREA 2 PLAN

3/16" = 1'-0"

KEYNOTES

NO.	
01 21 00.E217	TYP. ALLOWANCE FOR FIXED MULTIPLE SEATING WORK.
05 51 33.A000	STEEL ROOF ACCESS LADDER
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
10 43 13.0007	TYP. WALL CABINENT MOUNTED AUTOMATIC ELECTRONIC DEFIBRILLATOR (AED).
32 16 23.0405	TYP. 4" BROOM FINISHED CONCRETE SIDEWALK.
34 01 73.0092	TYP. PRESERVE EDGE OF AIRFIELD CONSTRUCTION. COORDINATE PROTECTION OF BUILT ELEMENTS WITH ADJACENT PROJECT.

NOTES

1. REFER TO **AL641** FOR PARTITION TYPES
2. ALL PARTITIONS ARE DIMENSIONED FROM FACE OF FINISH TO FACE OF FINISH U.O.N.
3. ALL WALL PARTITIONS TO BE FULL HEIGHT U.O.N.
4. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE.
5. MAINTAIN 1/16" SLOPE MINIMUM AND 1/4" SLOPE MAXIMUM TO AREA DRAINS
6. FOR FIRE EXTINGUISHER DETAILS REFER TO **AL710**
7. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET SERIES **A711**
8. HINGE DOORS SIDE OF DOORS TO BE LOCATED PER DETAILS FROM FACE OF ADJACENT PERPENDICULAR PARTITIONS U.O.N.
9. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
10. FOR RAILING DETAILS REFER TO SHEET **A865**
11. REFER TO **AF** SERIES SHEETS FOR FINISH INFORMATION.
12. SHOP-APPLIED GALVANIZATION FOR METAL, TOUCH UP ALL DAMAGED GALVANIZATION WITHIN 24HRS OF ERECTION
13. CONTRACTOR TO PROVIDE SIGNED AND SEALED DRAWINGS AND LOAD CALCULATIONS IN COMPLIANCE WITH FLORIDA BUILDING CODE WITH SUPPLEMENTS FOR ALL FABRICATED STAIRS, LADDERS, GRAB BARS, GUARDS, HANDRAILS AND/OR PLATFORMS. MINIMUM 50 PLF AND 200 POUND CONCENTRATED DESIGN LOADS.
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LIFE SAFETY LEGEND

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OKALOOSA COUNTY

FLY VPS

C19-2811- AP Construction of Satellite Concourse 'C'

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MLM JOB #: TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	As indicated

Drawing Title:

ENLARGED FLOOR PLAN - AREA 2

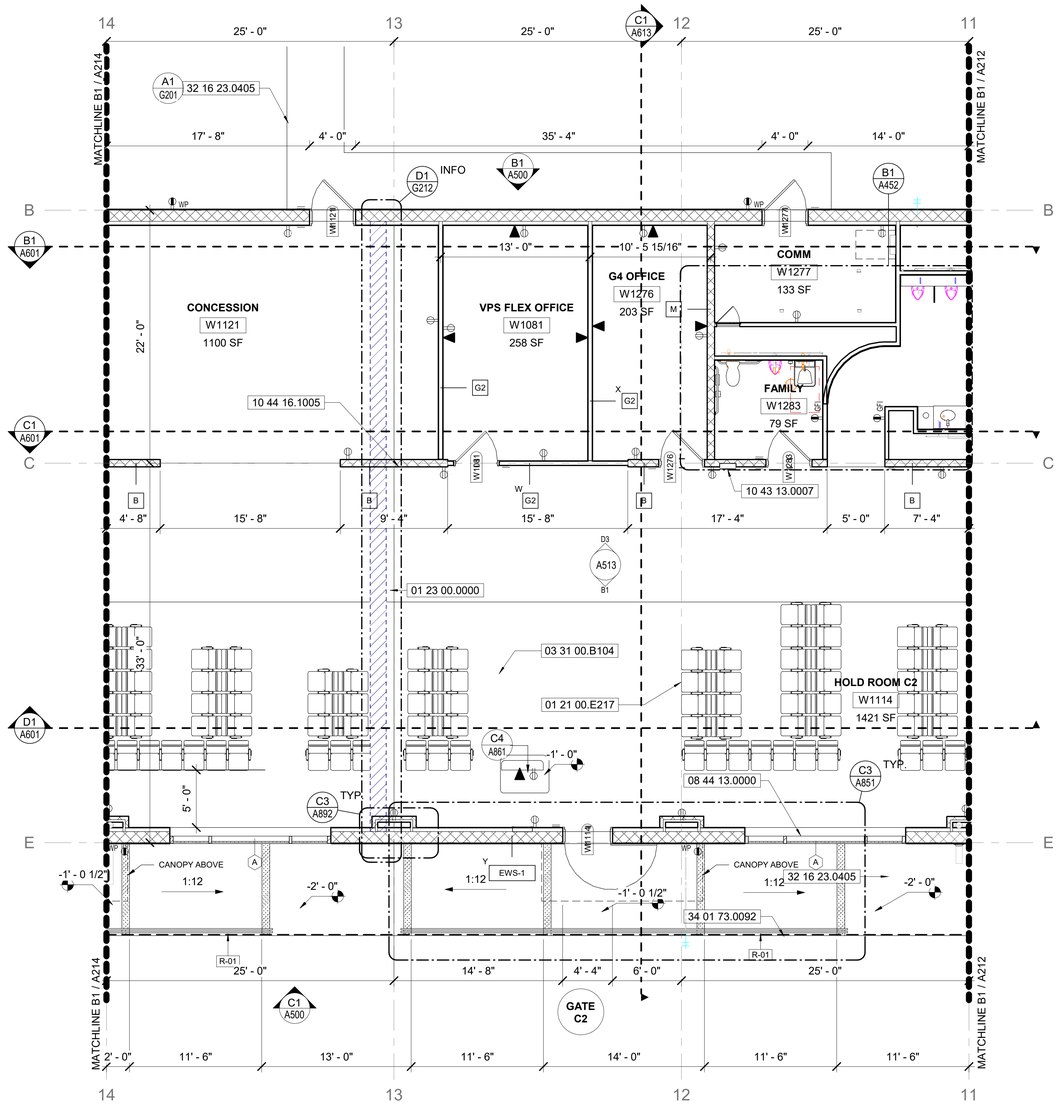
BID DOCUMENTS

Drawing No.:

A212

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

12/8/2020 5:35:04 PM



B1 CONCOURSE LEVEL AREA 3 PLAN

3/16" = 1'-0"

NORTH

KEYNOTES

NO.	
01 21 00.E217	TYP. ALLOWANCE FOR FIXED MULTIPLE SEATING WORK.
01 23 00.0000	LIMITS OF ALTERNATE WORK, SEE SPECIFICATIONS FOR MORE INFORMATION.
03 31 00.B104	TYP. 4" STRUCTURAL SLAB-ON-GRADE, SEE STRUCTURAL.
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
10 43 13.0007	TYP. WALL CABINENT MOUNTED AUTOMATIC ELECTRONIC DEFIBRILLATOR (AED).
10 44 16.1005	TYP. RECESSED WALL CABINENT MOUNTED MULTI-PURPOSE (ABC CLASS) FIRE EXTINGUISHER.
32 16 23.0405	TYP. 4" BROOM FINISHED CONCRETE SIDEWALK.
34 01 73.0092	TYP. PRESERVE EDGE OF AIRFIELD CONSTRUCTION. COORDINATE PROTECTION OF BUILT ELEMENTS WITH ADJACENT PROJECT.

NOTES

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3. ALL WALL PARTITIONS TO BE FULL HEIGHT U.O.N.
4. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE.
5. MAINTAIN 1/16" SLOPE MINIMUM AND 1/4" SLOPE MAXIMUM TO AREA DRAINS
6. FOR FIRE EXTINGUISHER DETAILS REFER TO **AL710**
7. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET SERIES **A711**
8. HINGE DOORS SIDE OF DOORS TO BE LOCATED PER DETAILS FROM FACE OF ADJACENT PERPENDICULAR PARTITIONS U.O.N.
9. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
10. FOR RAILING DETAILS REFER TO SHEET **A865**
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LIFE SAFETY LEGEND

RATED FIRE PARTITIONS
1 = 1 HOUR FIRE PARTITION
2 = 2 HOUR FIRE PARTITION

SCALE: 3/16" = 1'-0"
0 16" 32" 64" 128"

C19-2811- AP
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MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED FLOOR PLAN - AREA 3

BID DOCUMENTS

Drawing No.:

A213

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt
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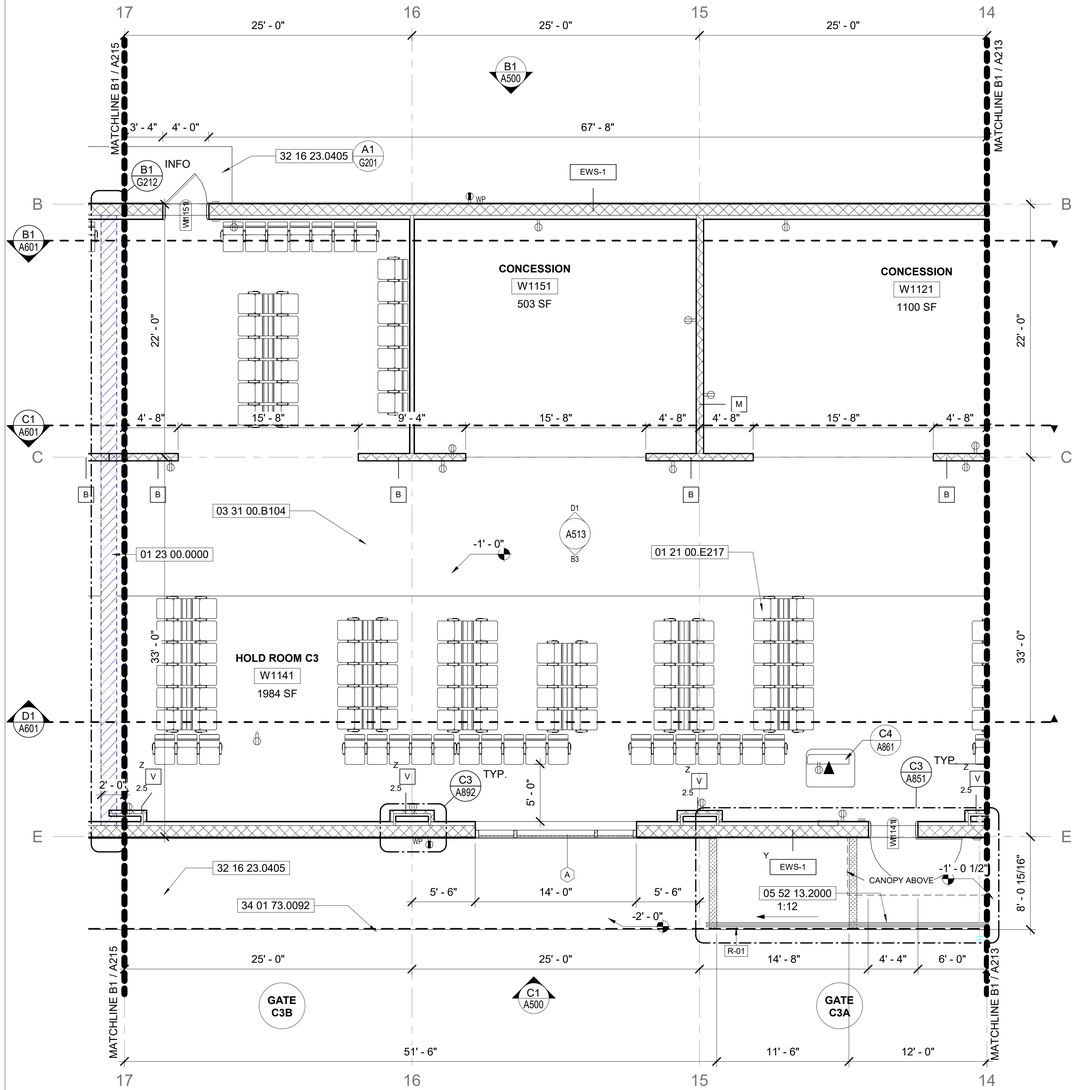

B1 CONCOURSE LEVEL AREA 4 PLAN

3/16" = 1'-0"

NORTH

KEYNOTES

NO.	
01 21 00.E217	TYP. ALLOWANCE FOR FIXED MULTIPLE SEATING WORK.
01 23 00.0000	LIMITS OF ALTERNATE WORK, SEE SPECIFICATIONS FOR MORE INFORMATION.
03 31 00.B104	TYP. 4" STRUCTURAL SLAB-ON-GRADE, SEE STRUCTURAL.
05 52 13.2000	TYP. STAINLESS STEEL PIPE AND TUBE RAILING.
32 16 23.0405	TYP. 4" BROOM FINISHED CONCRETE SIDEWALK.
34 01 73.0092	TYP. PRESERVE EDGE OF AIRFIELD CONSTRUCTION. COORDINATE PROTECTION OF BUILT ELEMENTS WITH ADJACENT PROJECT.

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LIFE SAFETY LEGEND

RATED FIRE PARTITIONS.
1 = 1 HOUR FIRE PARTITION
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SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

C19-2811- AP
Construction of Satellite Concourse 'C'

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ULM JOB # TYP. PROPERTY
MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED FLOOR PLAN - AREA 4

BID DOCUMENTS

Drawing No.:

A214

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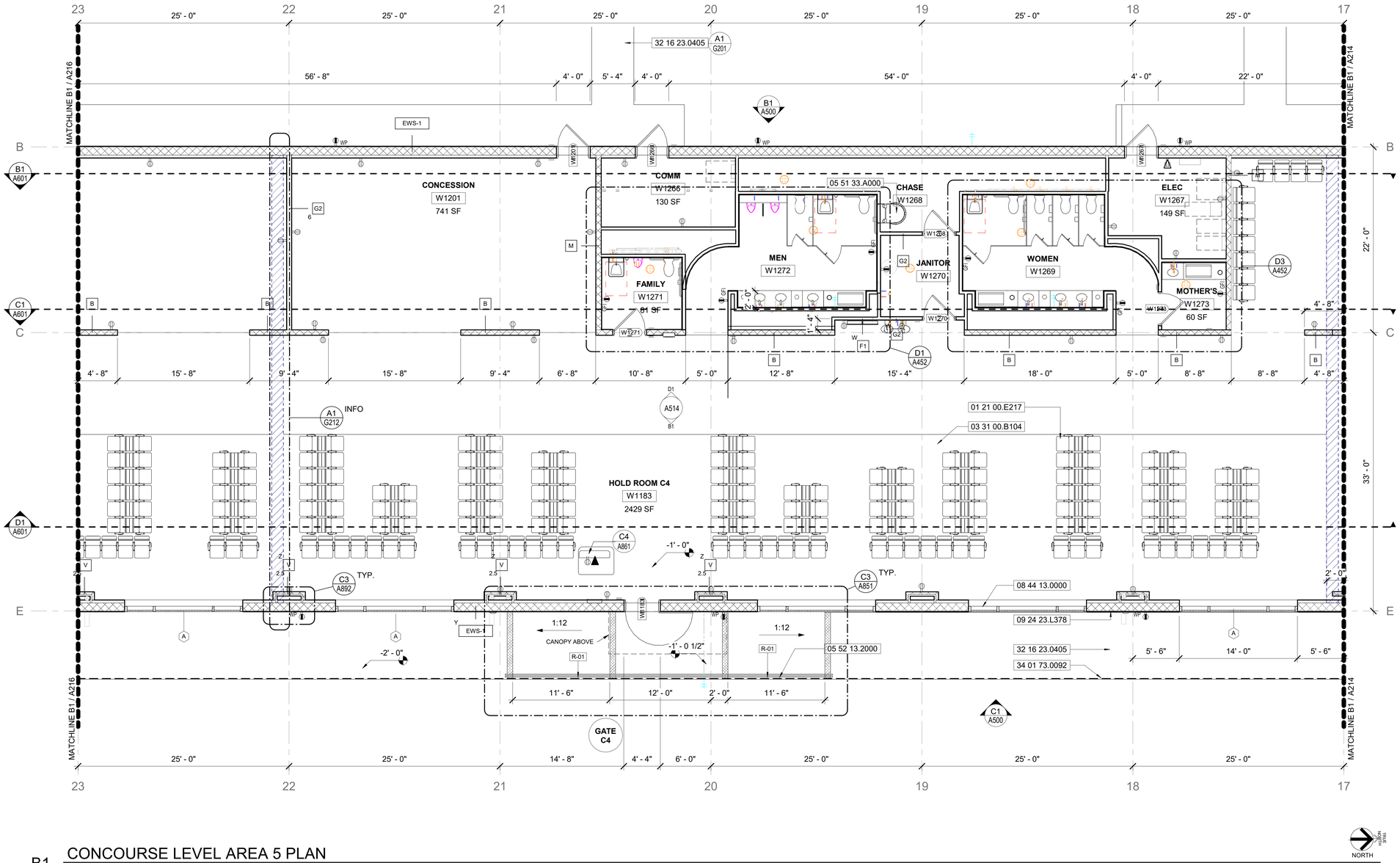

B1 CONCOURSE LEVEL AREA 5 PLAN

3/16" = 1'-0"

KEYNOTES

NO.	
01 21 00.E217	TYP. ALLOWANCE FOR FIXED MULTIPLE SEATING WORK.
03 31 00.B104	TYP. 4" STRUCTURAL SLAB-ON-GRADE, SEE STRUCTURAL.
05 51 33.A000	STEEL ROOF ACCESS LADDER
05 52 13.2000	TYP. STAINLESS STEEL PIPE AND TUBE RAILING.
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
32 16 23.0405	TYP. 4" BROOM FINISHED CONCRETE SIDEWALK.
34 01 73.0092	TYP. PRESERVE EDGE OF AIRFIELD CONSTRUCTION. COORDINATE PROTECTION OF BUILT ELEMENTS WITH ADJACENT PROJECT.

NOTES

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2. ALL PARTITIONS ARE DIMENSIONED FROM FACE OF FINISH TO FACE OF FINISH U.O.N.
3. ALL WALL PARTITIONS TO BE FULL HEIGHT U.O.N.
4. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE.
5. MAINTAIN 1/16" SLOPE MINIMUM AND 1/4" SLOPE MAXIMUM TO AREA DRAINS
6. FOR FIRE EXTINGUISHER DETAILS REFER TO **AL710**
7. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET SERIES **A711**
8. HINGE DOORS SIDE OF DOORS TO BE LOCATED PER DETAILS FROM FACE OF ADJACENT PERPENDICULAR PARTITIONS U.O.N.
9. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
10. FOR RAILING DETAILS REFER TO SHEET **A865**
11. REFER TO **AF** SERIES SHEETS FOR FINISH INFORMATION.
12. SHOP-APPLIED GALVANIZATION FOR METAL, TOUCH UP ALL DAMAGED GALVANIZATION WITHIN 24HRS OF ERECTION
13. CONTRACTOR TO PROVIDE SIGNED AND SEALED DRAWINGS AND LOAD CALCULATIONS IN COMPLIANCE WITH FLORIDA BUILDING CODE WITH SUPPLEMENTS FOR ALL FABRICATED STAIRS, LADDERS, GRAB BARS, GUARDS, HANDRAILS AND/OR PLATFORMS. MINIMUM 50 PLF AND 200 POUND CONCENTRATED DESIGN LOADS.
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LIFE SAFETY LEGEND

RATED FIRE PARTITIONS
1 = 1 HOUR FIRE PARTITION
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SCALE: 3/16" = 1'-0"
0 16" 32" 64" 128"

OKALOOSA COUNTY

FLY VPS

C19-2811- AP Construction of Satellite Concourse 'C'

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FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED FLOOR PLAN - AREA 5

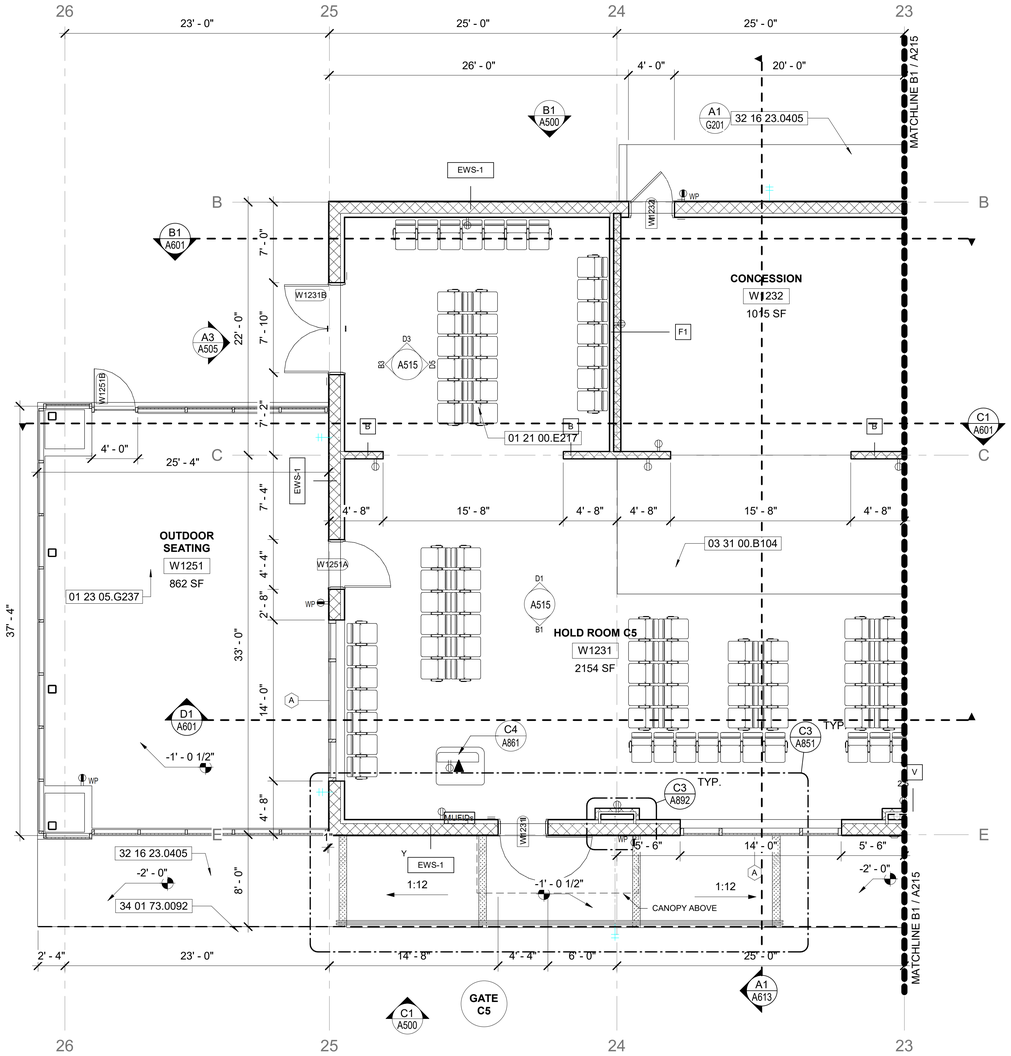
BID DOCUMENTS

Drawing No.:

A215

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

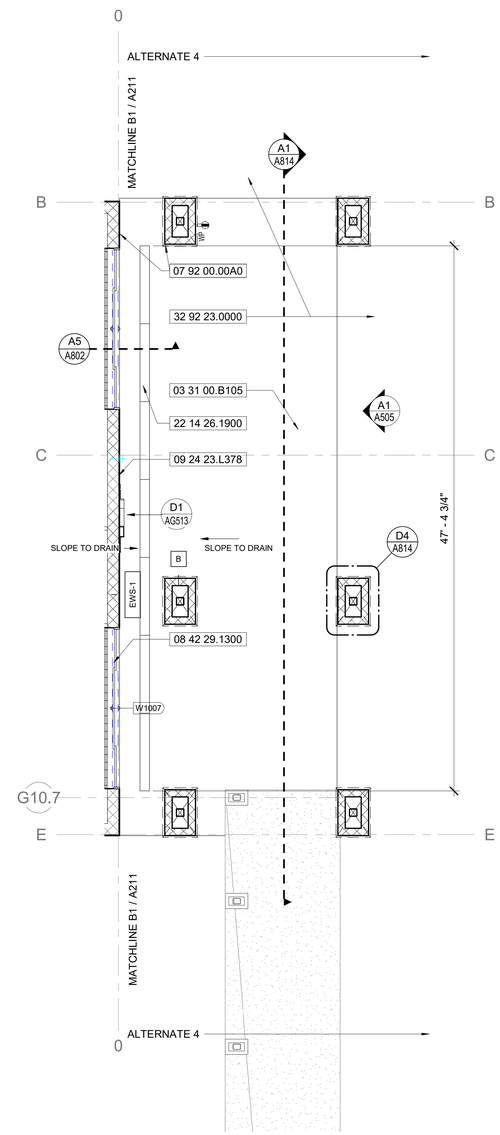
12/8/2020 5:35:43 PM



B1 CONCOURSE LEVEL AREA 6 PLAN

3/16" = 1'-0"

NORTH



B4 ALTERNATE 4 PLAN

3/16" = 1'-0"

NORTH

KEYNOTES

NO.	
01 21 00.E217	TYP. ALLOWANCE FOR FIXED MULTIPLE SEATING WORK.
01 23 05.G237	TYP. ALTERNATE 5 EXTERIOR CONCESSIONS PLAZA WORK.
03 31 00.B104	TYP. 4" STRUCTURAL SLAB-ON-GRADE, SEE STRUCTURAL.
03 31 00.B105	TYP. 5" CONCRETE FLOOR SLAB, SEE STRUCTURAL
07 92 00.00A0	TYP. JOINT SEALANT, FULL PERIMETER.
08 42 29.1300	TYP. ALUMINUM FRAMED AUTOMATIC ENTRANCE DOOR.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
22 14 26.1900	TYP. FACILITY STORM TRENCH DRAIN, SEE PLUMBING.
32 16 23.0405	TYP. 4" BROOM FINISHED CONCRETE SIDEWALK.
32 92 23.0000	TYP. SODDING AND PLANTING SEE LANDSCAPE.
34 01 73.0092	TYP. PRESERVE EDGE OF AIRFIELD CONSTRUCTION. COORDINATE PROTECTION OF BUILT ELEMENTS WITH ADJACENT PROJECT.

NOTES

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3. ALL WALL PARTITIONS TO BE FULL HEIGHT U.O.N.
4. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE.
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OKALOOSA COUNTY

FLY VPS

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Revisions

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Drawing Scale:	As indicated

Drawing Title:

ENLARGED FLOOR PLAN - AREA 6

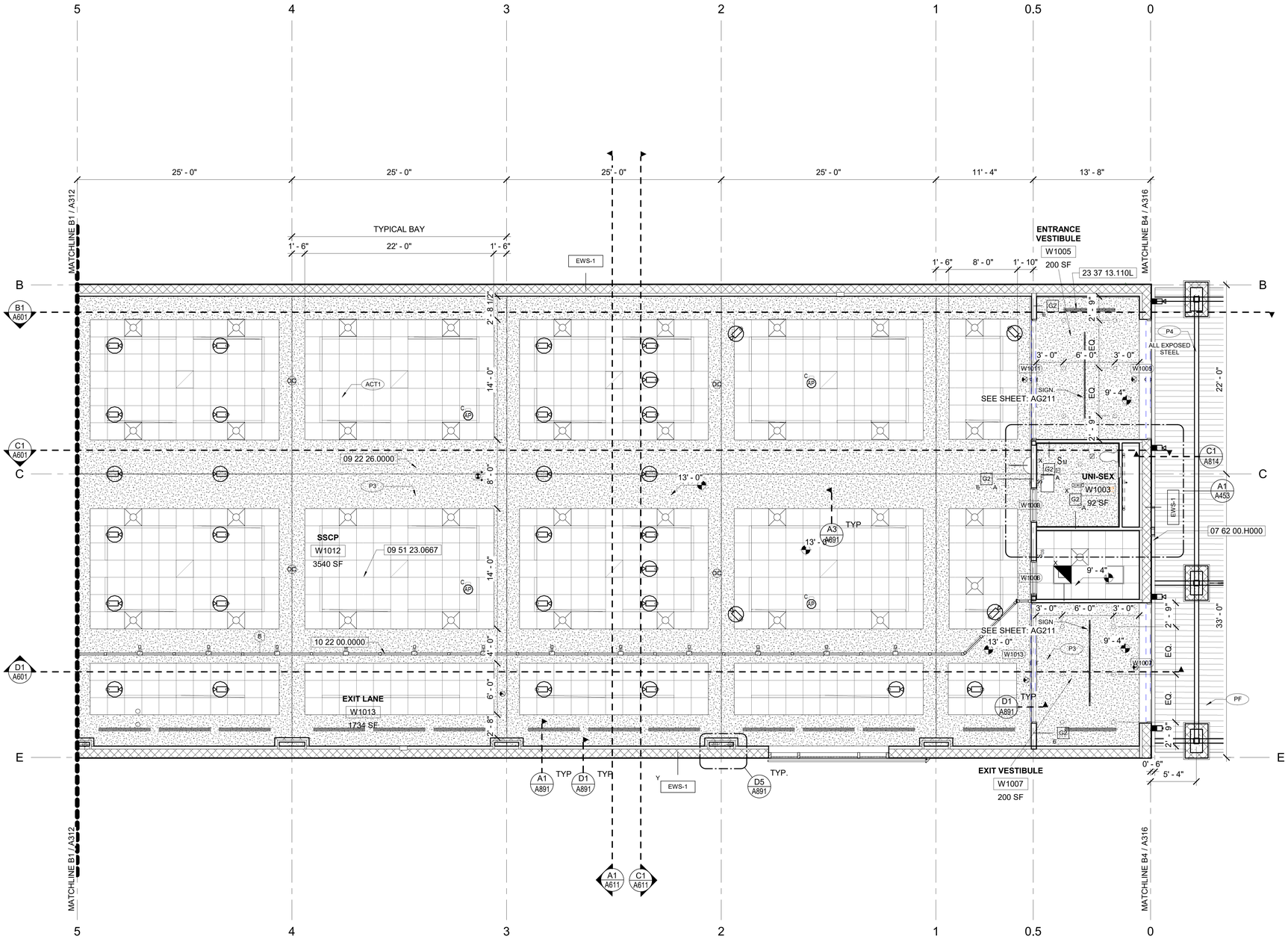
BID DOCUMENTS

Drawing No.:

A216

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

12/8/2020 5:35:58 PM



B1 CEILING AREA PLAN
3/16" = 1'-0"

KEYNOTES

NO.	
07 62 00.H000	TYP. 8" X 6" BEVELED ALUMINUM GUTTER.
09 22 26.0000	TYP. GYPSUM ASSEMBLY SUSPENSION SYSTEM, INSTALL PER MNFR. INSTRUCTIONS.
09 51 23.0667	TYP. STANDARD, 24" X 24" TEGULAR ACOUSITCAL TILE CEILING SYSTEM.
10 22 00.0000	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY.
23 37 13.110L	LINEAR DIFFUSER, SEE MECHANICAL

NOTES

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9. CONCESSION AREAS SHALL BE FIT OUT AS SHELL SPACES WITH CODE MINIMUM SYSTEMS SUPPORT AS INDICATED.

CEILING LEGEND

- 24" X 24" ACOUSTICAL TILE CEILING SYSTEM
- SUSPENDED GYPSUM WALL BOARD ASSEMBLY
- DIFFUSER / LINEAR, SEE MECH **M SERIES DOCUMENTS**
- SUPPLY / RETURN DIFFUSER, SEE MECH **M SERIES DOCUMENTS**
- LIGHT FIXTURES, SEE ELEC **E3## SERIES DOCUMENTS**
- OCCUPANCY LIGHTING CONTROLER, SEE ELEC **E3## SERIES DOCUMENTS**
- WIRELESS ACCESS POINT, SEE COMM **T SERIES DOCUMENTS**
- VSS CAMERA, SEE COMM **TS SERIES DOCUMENTS**
- ELEVATIONS PROVIDED FROM CONCOURSE LEVEL = 0' - 0"
- 1 HR RATED ASSEMBLY
- 2 HR RATED ASSEMBLY

SCALE: 3/16" = 1'-0"
0 16" 32" 64" 128"

OKALOOSA COUNTY

FLY VPS

C19-2811- AP Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
SUITE 107
MAITLAND, FL 32751
407.897.6764 (VOICE)
407.894.1338 (FAX)
WWW.MLM-MARTIN.COM
AA-C002208
MLM JOB # TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED CEILING PLAN - AREA 1

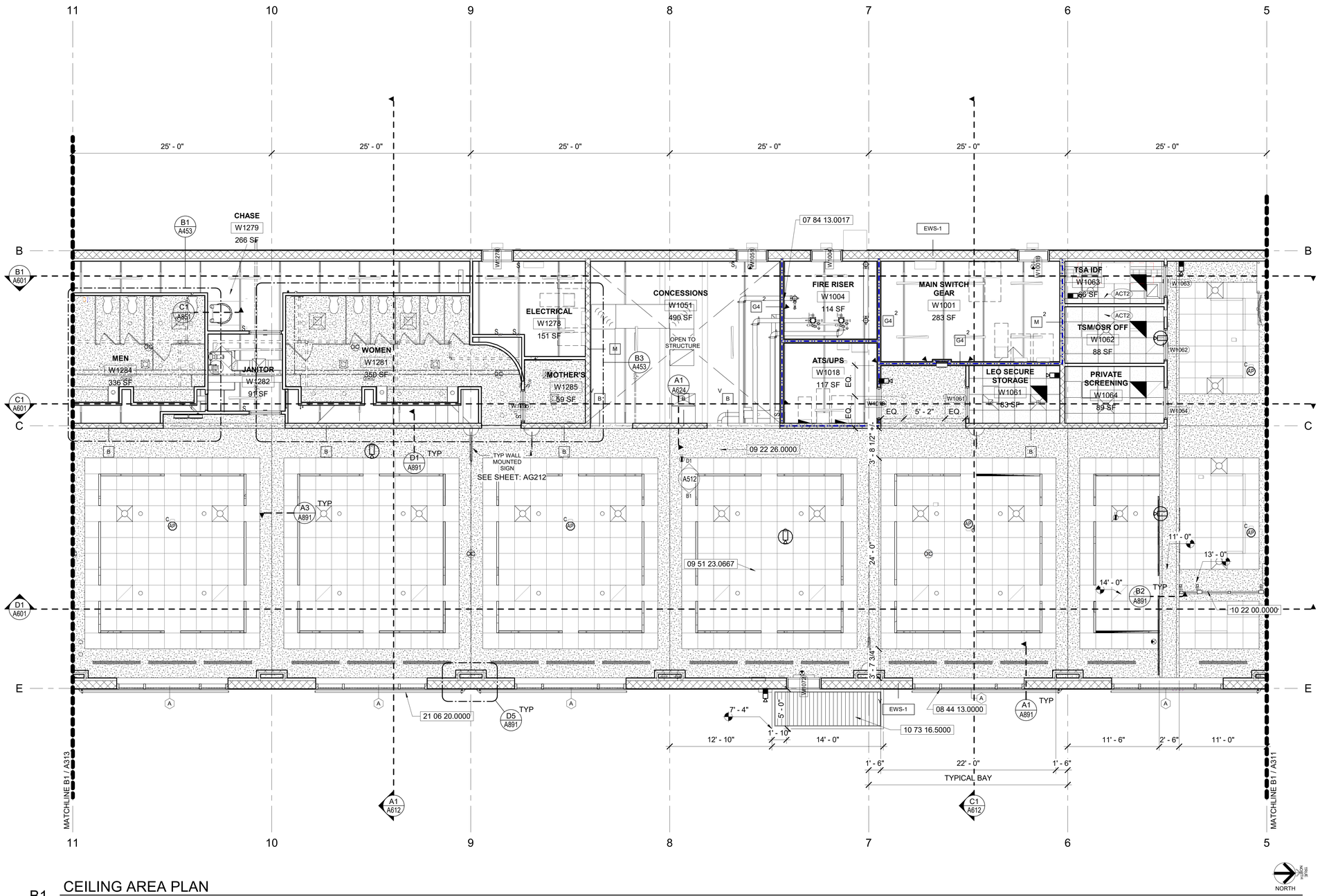
BID DOCUMENTS

Drawing No.:

A311

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

12/8/2020 5:36:10 PM



B1 CEILING AREA PLAN

3/16" = 1'-0"

KEYNOTES

NO.	
07 84 13.0017	TYP. PROTECT AND SEAL FIRE WALL FROM ALL EXISTING AND NEW PENETRATIONS W/ APPROPRIATE UL LISTED FIRESTOPPING ASSEMBLIES TO MAINTAIN ROOM RATING AND FIRE PROTECTION PRESSURIZATION REQUIREMENTS.
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
09 22 26.0000	TYP. GYPSUM ASSEMBLY SUSPENSION SYSTEM, INSTALL PER MNFR. INSTRUCTIONS.
09 51 23.0667	TYP. STANDARD, 24" X 24" TEGULAR ACOUSITCAL TILE CEILING SYSTEM.
10 22 00.0000	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY.
10 73 16.5000	TYP. PREMANUFACTURED ALUMINUM CANOPY SYSTEM. PROVIDE SIGNED & SEALED CALCULATIONS/SHOPDRAWINGS COMPLYING W/ STRUCTURAL DESIGN LOADS.
21 06 20.0000	TYPICAL FIRE SUPPRESSION PIPING

NOTES

1. REFER TO **AL641** FOR PARTITION TYPES
2. ALL PARTITIONS ARE DIMENSIONED FROM FACE OF FINISH TO FACE OF FINISH U.O.N.
3. ALL WALL PARTITIONS TO BE FULL HEIGHT U.O.N.
4. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE.
5. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET SERIES **A711**
6. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
7. REFER TO **AF** SERIES SHEETS FOR FINISH INFORMATION.
8. AREA DESIGNATED FOR FUTURE WORK (NIC). CONTRACTOR SHALL KEEP THIS AREA CLEAR OF ANY BUILT ELEMENTS ABOVE AND/OR BELOW GROUND UNLESS OTHERWISE NOTED WITHIN THE SCOPE OF THIS PROJECT.
9. CONCESSION AREAS SHALL BE FIT OUT AS SHELL SPACES WITH CODE MINIMUM SYSTEMS SUPPORT AS INDICATED.

CEILING LEGEND

- 24" X 24" ACOUSTICAL TILE CEILING SYSTEM
- SUSPENDED GYPSUM WALL BOARD ASSEMBLY
- DIFFUSER / LINEAR, SEE MECH **M SERIES DOCUMENTS**
- SUPPLY / RETURN DIFFUSER, SEE MECH **M SERIES DOCUMENTS**
- LIGHT FIXTURES, SEE ELEC **E3## SERIES DOCUMENTS**
- OCCUPANCY LIGHTING CONTROLER, SEE ELEC **E3## SERIES DOCUMENTS**
- WIRELESS ACCESS POINT, SEE COMM **T SERIES DOCUMENTS**
- VSS CAMERA, SEE COMM **TS SERIES DOCUMENTS**
- ELEVATIONS PROVIDED FROM CONCOURSE LEVEL = 0' - 0"
- 1 HR RATED ASSEMBLY
- 2 HR RATED ASSEMBLY

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction of Satellite Concourse 'C'

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AA-C002208
MLM JOB # / TYP. PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED CEILING PLAN - AREA 2

BID DOCUMENTS

Drawing No.:

A312

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

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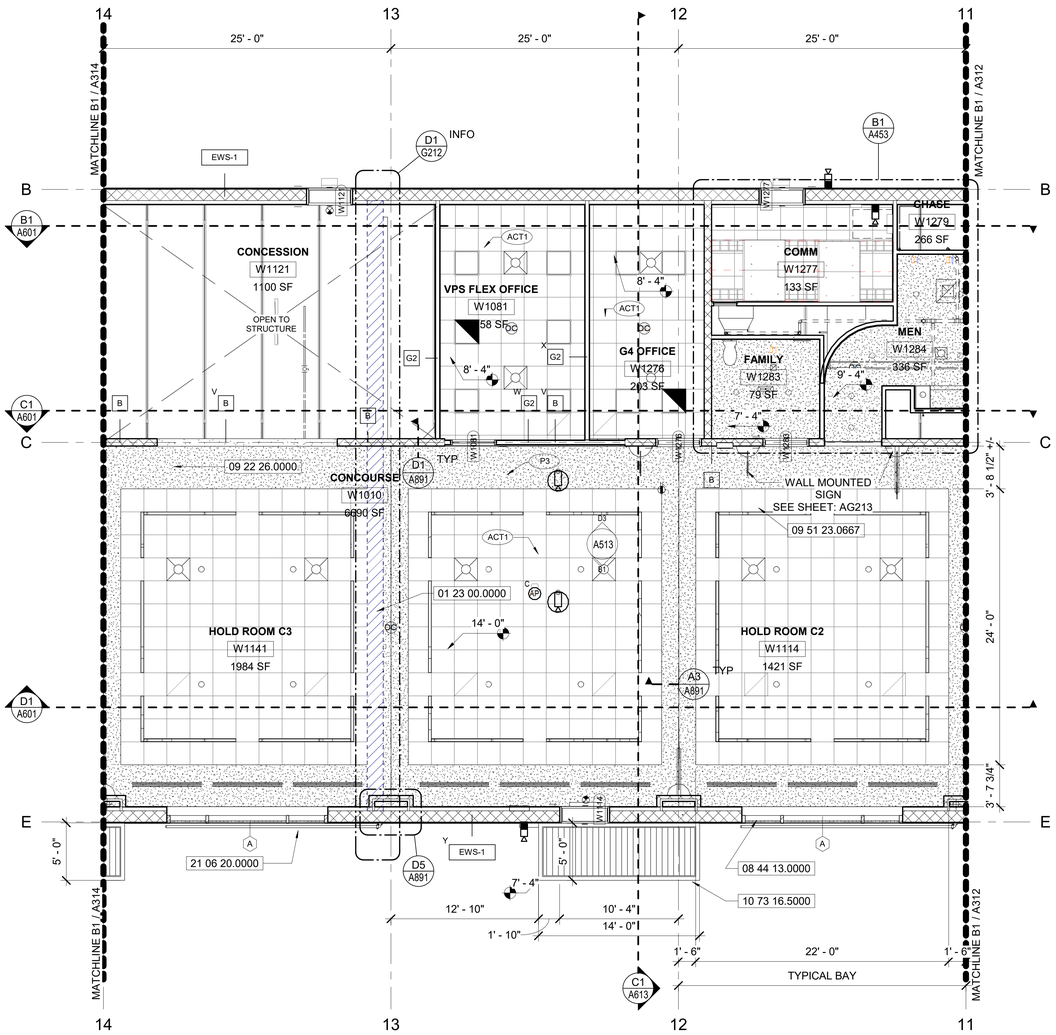

B1 CEILING AREA PLAN

3/16" = 1'-0"

NORTH

KEYNOTES

NO.	
01 23 00.0000	LIMITS OF ALTERNATE WORK, SEE SPECIFICATIONS FOR MORE INFORMATION.
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
09 22 26.0000	TYP. GYPSUM ASSEMBLY SUSPENSION SYSTEM, INSTALL PER MNFR. INSTRUCTIONS.
09 51 23.0667	TYP. STANDARD, 24" X 24" TEGULAR ACOUSITCAL TILE CEILING SYSTEM.
10 73 16.5000	TYP. PREMANUFACTURED ALUMINUM CANOPY SYSTEM. PROVIDE SIGNED & SEALED CALCULATIONS/SHOPDRAWINGS COMPLYING W/ STRUCTURAL DESIGN LOADS.
21 06 20.0000	TYPICAL FIRE SUPPRESSION PIPING

NOTES

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5. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET SERIES **A711**
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CEILING LEGEND

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- SUSPENDED GYPSUM WALL BOARD ASSEMBLY
- DIFFUSER / LINEAR, SEE MECH **M SERIES DOCUMENTS**
- SUPPLY / RETURN DIFFUSER, SEE MECH **M SERIES DOCUMENTS**
- LIGHT FIXTURES, SEE ELEC **E3## SERIES DOCUMENTS**
- OCCUPANCY LIGHTING CONTROLER, SEE ELEC **E3## SERIES DOCUMENTS**
- WIRELESS ACCESS POINT, SEE COMM **T SERIES DOCUMENTS**
- VSS CAMERA, SEE COMM **TS SERIES DOCUMENTS**
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- 1 HR RATED ASSEMBLY
- 2 HR RATED ASSEMBLY

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

OKALOOSA COUNTY

FLY VPS

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MLM JOB #: TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED CEILING PLAN - AREA 3

BID DOCUMENTS

Drawing No.:

A313

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

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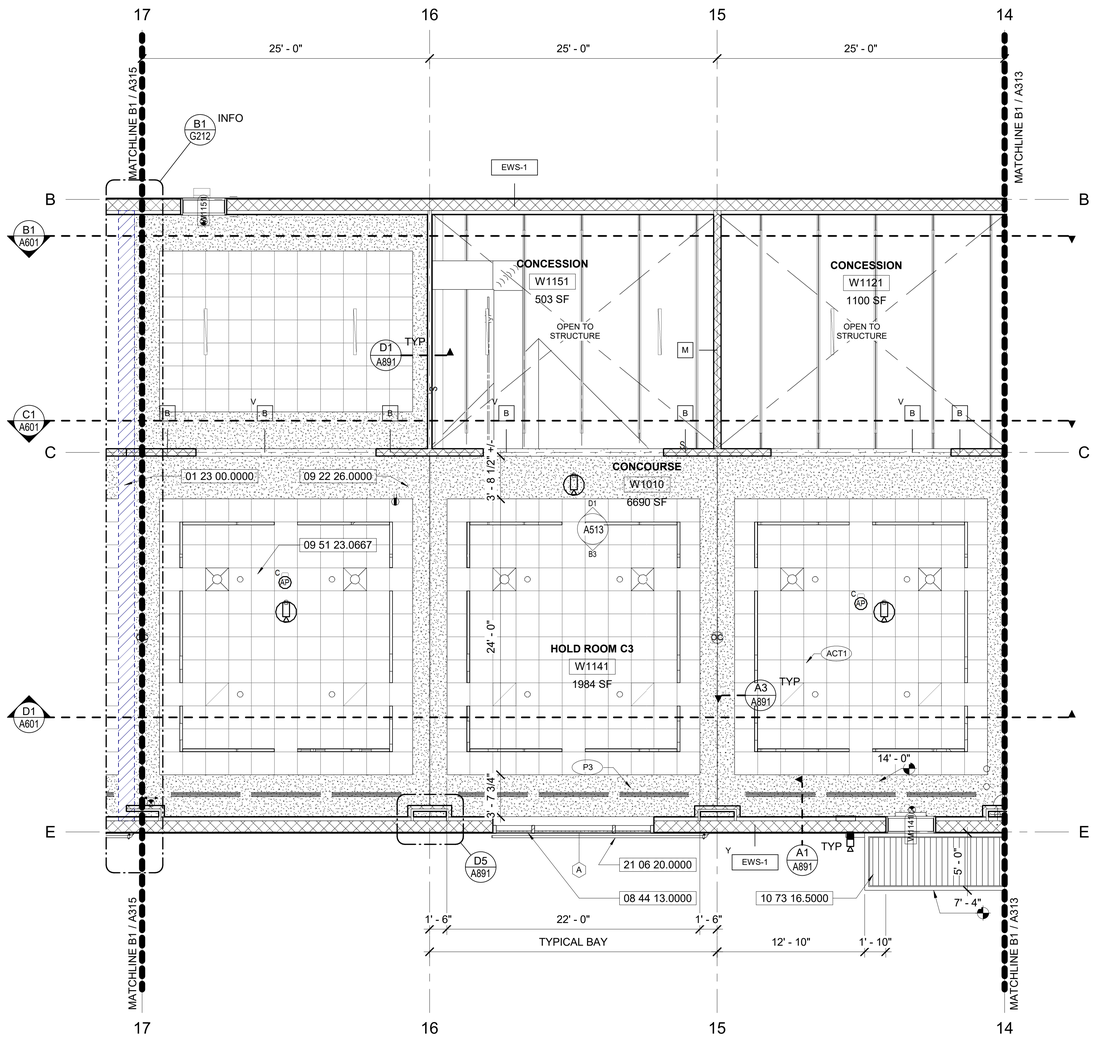

B1 CEILING AREA PLAN

3/16" = 1'-0"

NORTH

KEYNOTES

NO.	
01 23 00.0000	LIMITS OF ALTERNATE WORK, SEE SPECIFICATIONS FOR MORE INFORMATION.
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21 06 20.0000	TYPICAL FIRE SUPPRESSION PIPING

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0 16" 32" 64" 128"

OKALOOSA COUNTY

FLY VPS

C19-2811- AP Construction of Satellite Concourse 'C'

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MAITLAND, FL 32751
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WWW.MLM-MARTIN.COM
AA-C002208
MLM JOB #: TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED CEILING PLAN - AREA 4

BID DOCUMENTS

Drawing No.:

A314

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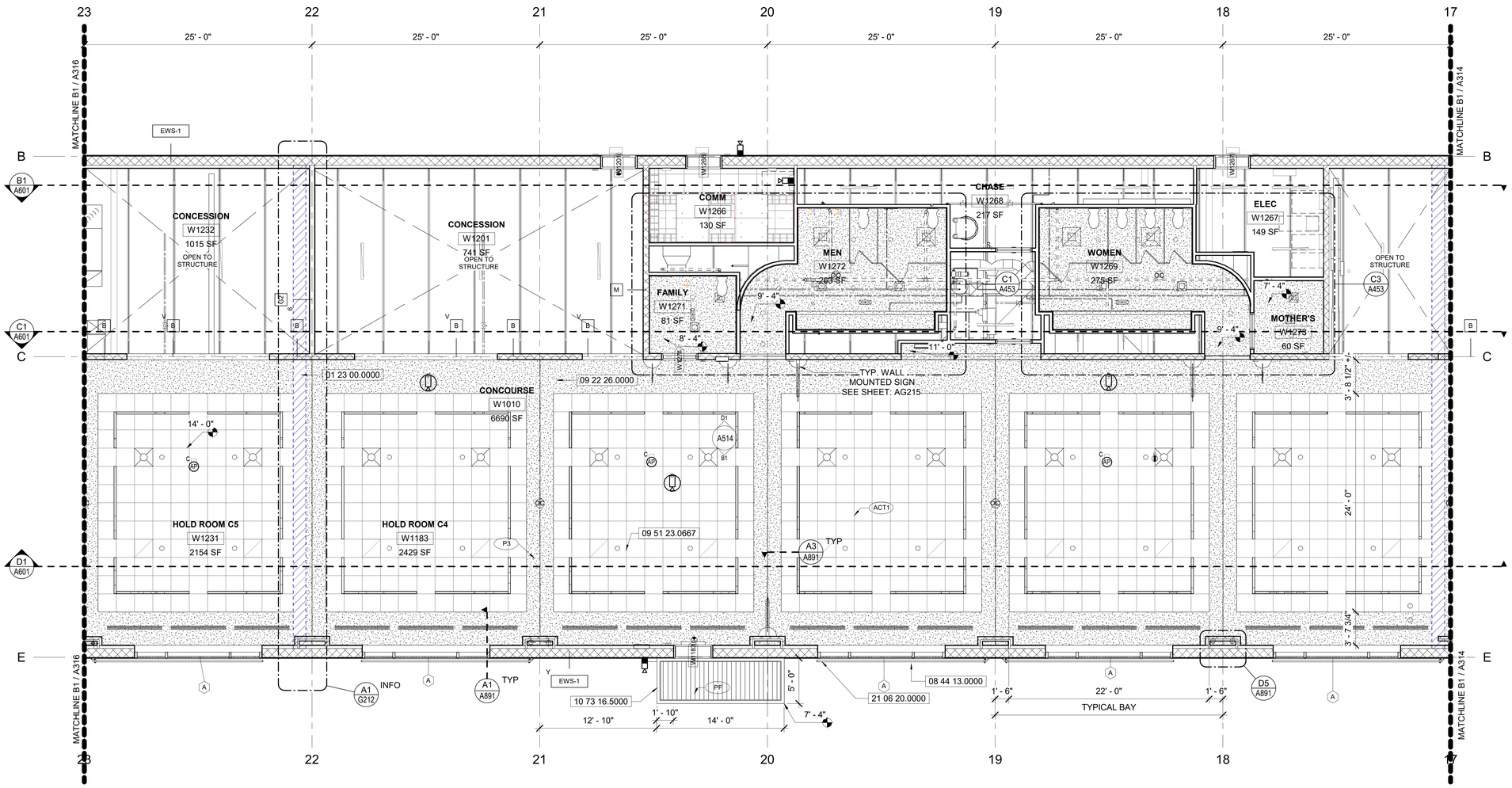

B1 CEILING AREA PLAN

3/16" = 1'-0"

KEYNOTES

NO.	
01 23 00.0000	LIMITS OF ALTERNATE WORK, SEE SPECIFICATIONS FOR MORE INFORMATION.
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
09 22 26.0000	TYP. GYPSUM ASSEMBLY SUSPENSION SYSTEM, INSTALL PER MNFR. INSTRUCTIONS.
09 51 23.0667	TYP. STANDARD, 24" X 24" TEGULAR ACOUSITCAL TILE CEILING SYSTEM.
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- 2 HR RATED ASSEMBLY

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

OKALOOSA COUNTY

FLY VPS

C19-2811- AP Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
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MAITLAND, FL 32751
407.897.6764 (VOICE)
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WWW.MLM-MARTIN.COM
AA-C002208
MLM JOB #: TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED CEILING PLAN - AREA 5

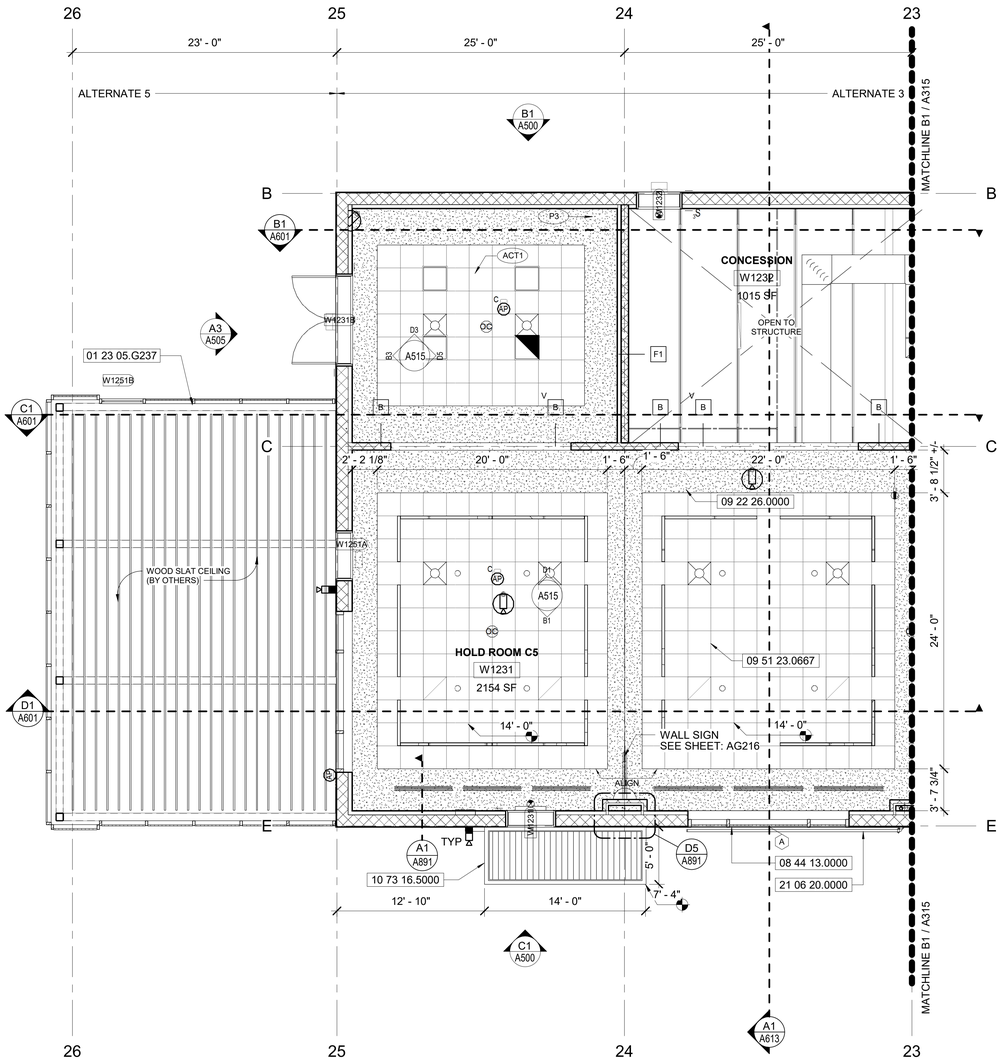
BID DOCUMENTS

Drawing No.:

A315

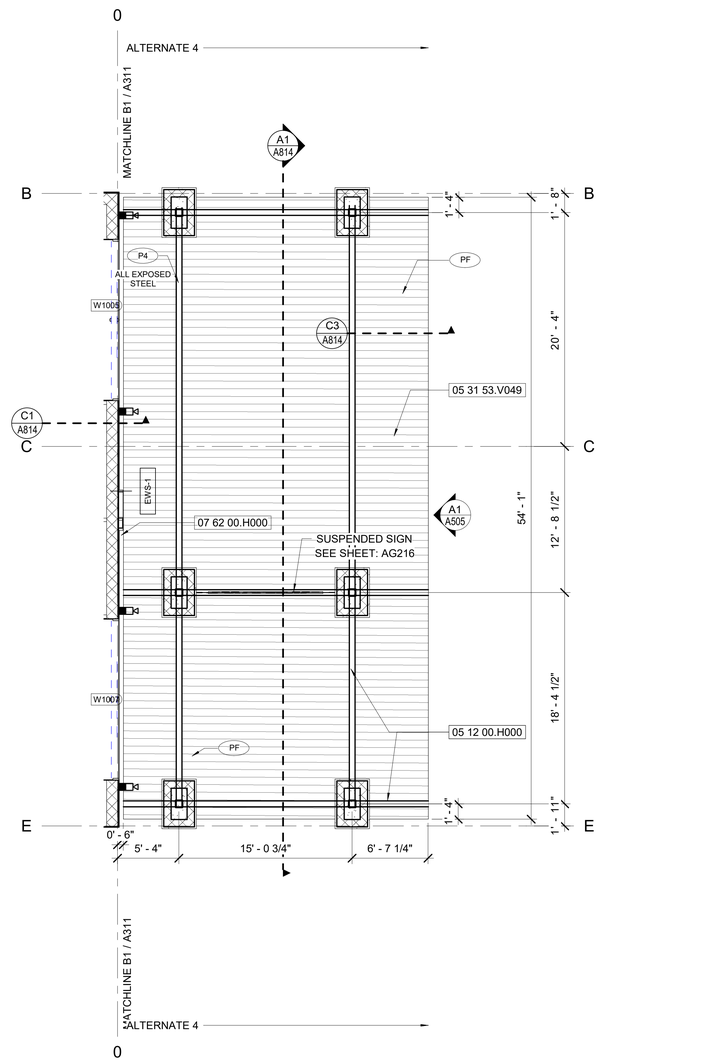
BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

12/8/2020 5:37:00 PM



B1 CEILING AREA PLAN

3/16" = 1'-0"



B4 ALTERNATE 4 CEILING PLAN

3/16" = 1'-0"

KEYNOTES

NO.	
01 23 05.G237	TYP. ALTERNATE 5 EXTERIOR CONCESSIONS PLAZA WORK.
05 12 00.H000	TYP. HSS SHAPE STRUCTURAL STEEL FRAMING, SEE STRUCTURAL.
05 31 53.V049	TYP. 4" DOVETAIL G-90 GALV. STEEL ARCHITECTURALLY EXPOSED DECK. BASIS OF DESIGN: EPIC TORIS 4 - CANOPY.
07 62 00.H000	TYP. 8" X 6" BEVELED ALUMINUM GUTTER.
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
09 22 26.0000	TYP. GYPSUM ASSEMBLY SUSPENSION SYSTEM, INSTALL PER MNFR. INSTRUCTIONS.
09 51 23.0667	TYP. STANDARD, 24" X 24" TEGULAR ACOUSITCAL TILE CEILING SYSTEM.
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21 06 20.0000	TYPICAL FIRE SUPPRESSION PIPING

NOTES

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- DIFFUSER / LINEAR, SEE MECH **M SERIES DOCUMENTS**
- SUPPLY / RETURN DIFFUSER, SEE MECH **M SERIES DOCUMENTS**
- LIGHT FIXTURES, SEE ELEC **E3## SERIES DOCUMENTS**
- OCCUPANCY LIGHTING CONTROLER, SEE ELEC **E3## SERIES DOCUMENTS**
- WIRELESS ACCESS POINT, SEE COMM **T SERIES DOCUMENTS**
- VSS CAMERA, SEE COMM **TS SERIES DOCUMENTS**
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- 2 HR RATED ASSEMBLY

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

C19-2811- AP
Construction of Satellite Concourse 'C'

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AA-C002208
ALM 308-F TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	**MLM-19672**
Designed By:	**MLM, MAM**
Drawn By:	**ST, CC, DM, CB**
Checked By:	**MAM**
Issue Date:	**30-NOV-2020**
Drawing Scale:	**3/16" = 1'-0"**

Drawing Title:

ENLARGED CEILING PLAN - AREA 6

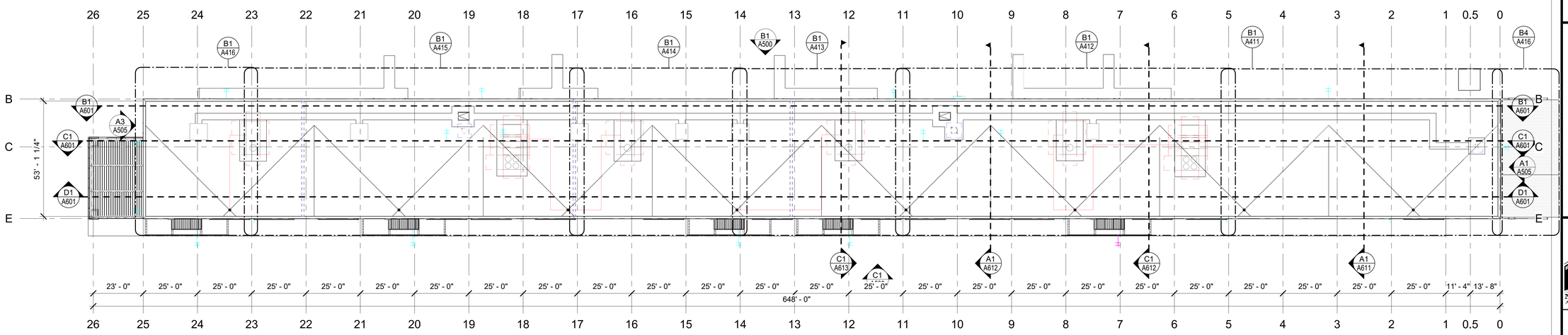
BID DOCUMENTS

Drawing No.:

A316

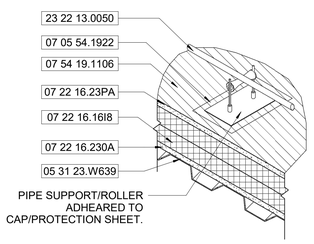
BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

12/8/2020 5:37:13 PM



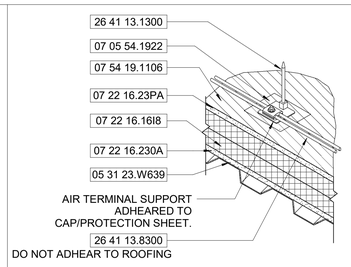
C1 OVERALL ROOF PLAN

1" = 20'-0"



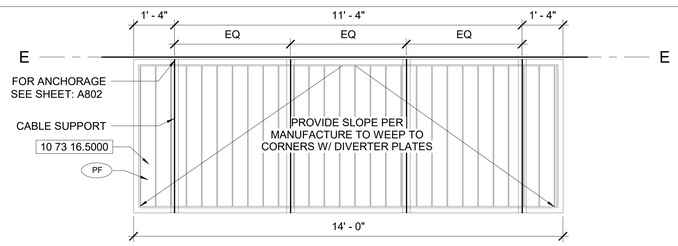
A1 PIPE SUPPORT

N.T.S.



A2 LIGHTING TERMINAL

N.T.S.



A3 PRE-FAB CANOPY PLAN DETAIL

1/2" = 1'-0"

SCALE: 1/2" = 1'-0"

0 6" 12" 24" 48"

KEYNOTES

NO.	
05 31 23.W639	TYP. 1-1/2" WR 20 GA. G90 STEEL ROOF DECK, SEE STRUCTURAL.
07 05 54.1922	TYP. PVC ROOFING MEMBRANE CAP/FLASHING PLY WELD.
07 22 16.16I8	TYP. 4" MIN. POLYISOCYANURATE RIGID FOAM ROOF BOARD INSULATION.
07 22 16.23PA	TYP. 5/8" PRIMED DENS DECK ROOF INSULATION COVER BOARD.
07 22 16.230A	TYP. 5/8" DENS DECK ROOF INSULATION COVER BOARD.
07 54 19.1106	TYP. COLD ADHESIVE APPLIED, 60 MIL PVC MEMBRAINE ROOFING.
10 73 16.5000	TYP. PREMANUFACTURED ALUMINUM CANOPY SYSTEM. PROVIDE SIGNED & SEALED CALCULATIONS/SHOPDRAWINGS COMPLYING W/ STRUCTURAL DESIGN LOADS.
23 22 13.0050	TYP. CONDENSATE PIPING, SEE MECH.
26 41 13.1300	TYP. LIGHTNING PROTECTION TERMINAL, SEE ELECTRICAL.
26 41 13.8300	TYP. LIGHTNING PROTECTION CONDUCTOR, SEE ELECTRICAL.

SCALE: 1" = 20'-0"

0 5' 10' 20' 40'

C19-2811- AP
Construction of Satellite Concourse 'C'

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AA-C002208
MLM JOB # TYP. PROPERTY

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FL AR-98279

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Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	AS NOTED

Drawing Title:

OVERALL ROOF PLAN

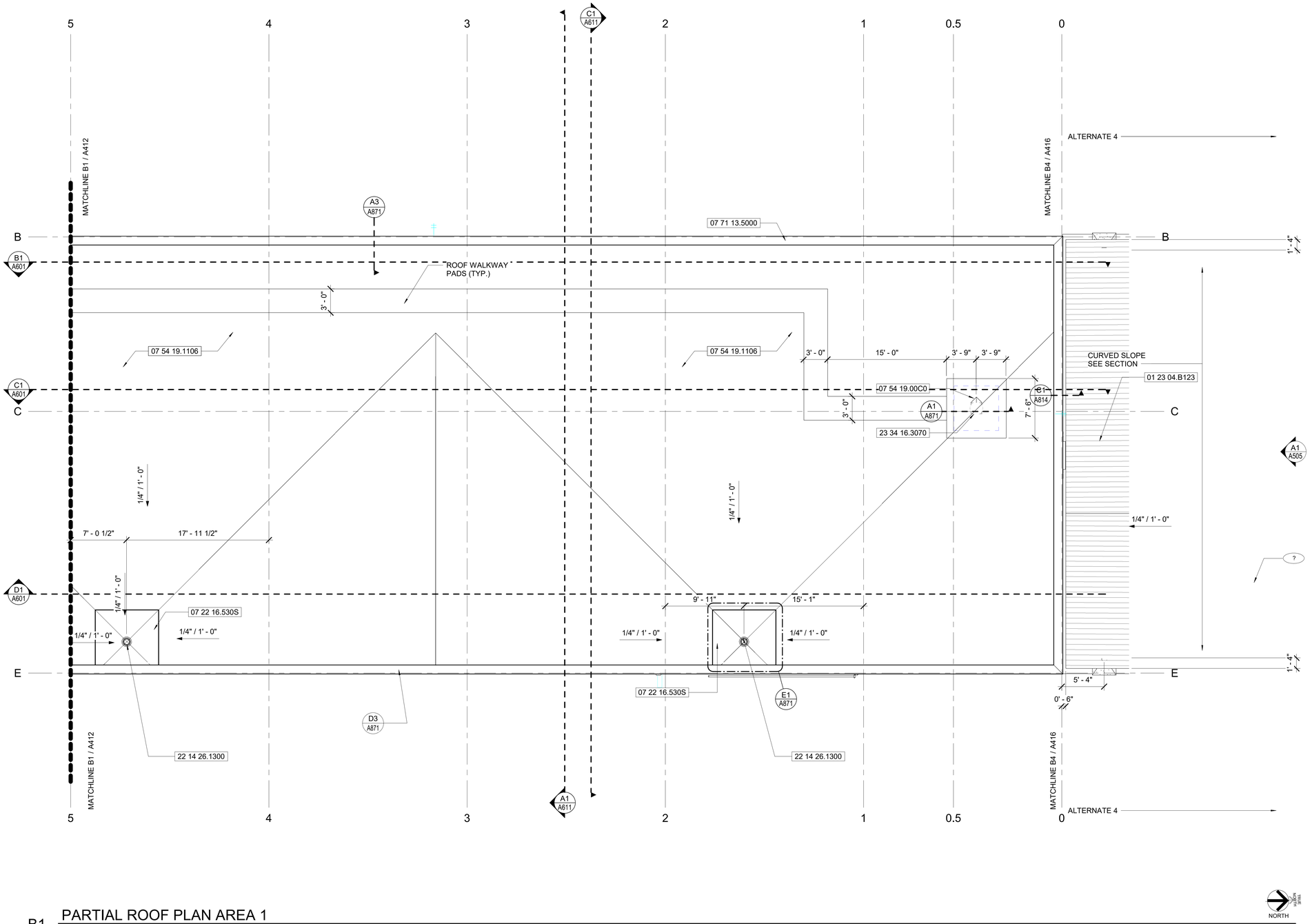
BID DOCUMENTS

Drawing No.:

A401

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

12/8/2020 5:37:38 PM



B1 PARTIAL ROOF PLAN AREA 1

3/16" = 1'-0"

KEYNOTES

NO.	
01 23 04.B123	TYP. ALTERNATE 4 CANOPY CONTRUCTION WORK.
07 22 16.530S	TYP. 1/2" PER FOOT TAPPERED SUMP AT ROOF DRAIN, SEE DETAIL.
07 54 19.00C0	TYP. ROOF CRICKET.
07 54 19.1106	TYP. COLD ADHESIVE APPLIED, 60 MIL PVC MEMBRAINE ROOFING.
07 71 13.5000	TYP. ALUMNINUM MANUFACTURED COPING SYSTEM, INSTALLED PER MNFR. INSTRUCTIONS.
22 14 26.1300	TYP. FACILITY STORM ROOF DRAIN W/ INTRIGAL OVERFLOW, SEE PLUMBING.
23 34 16.3070	TYP. ROOF TOP CENTRIFUGAL HVAC/EXHAUST FAN ON CURB, SEE MECHANICAL.

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

C19-2811- AP
Construction
of Satellite
Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
SUITE 107
MAITLAND, FL 32751
407.897.6764 (VOICE)
407.894.1338 (FAX)
WWW.MLM-MARTIN.COM
AA-C002208
ALM JOB # TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED ROOF PLAN - AREA 1

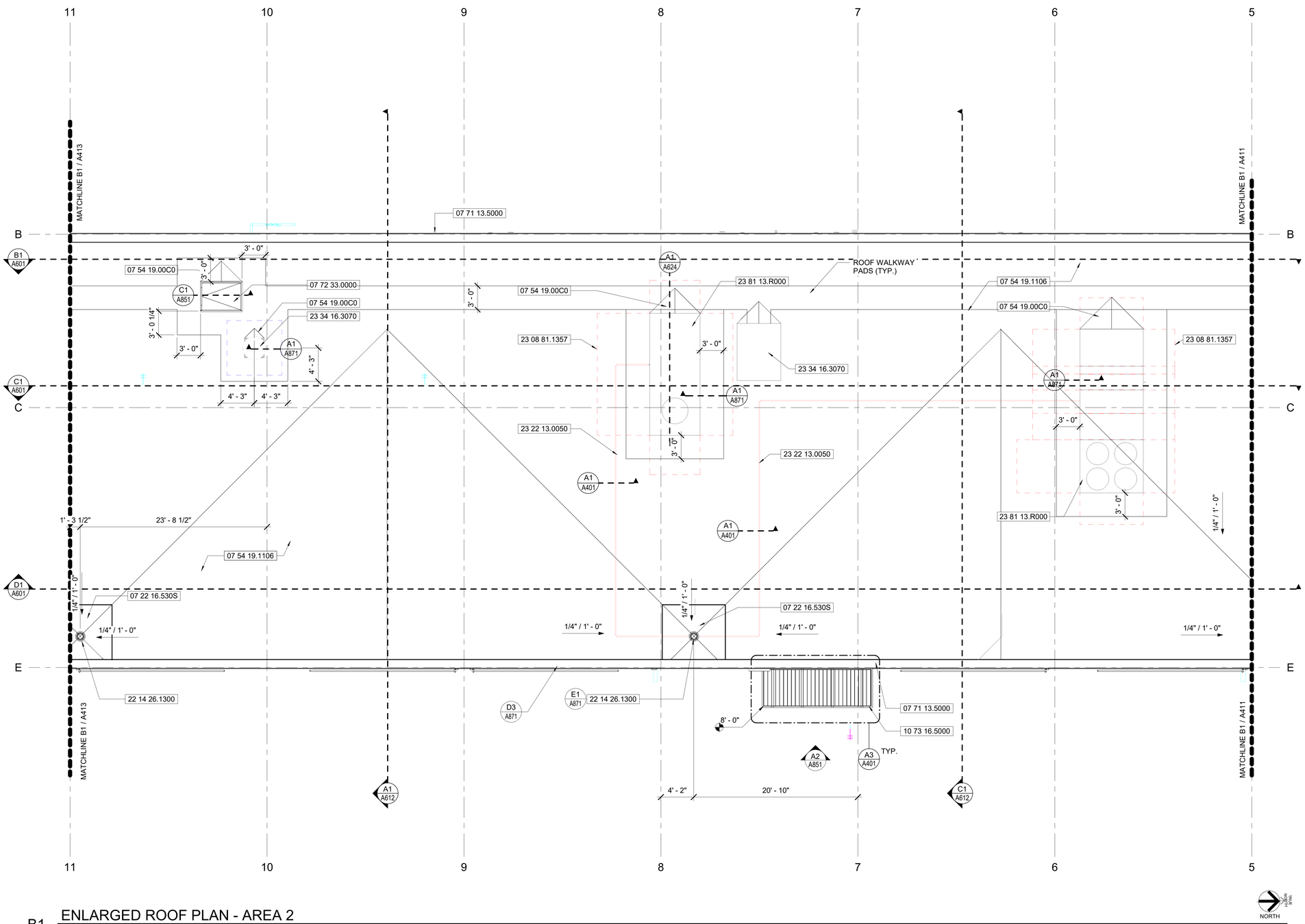
BID DOCUMENTS

Drawing No.:

A411

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

12/8/2020 5:37:48 PM



B1 ENLARGED ROOF PLAN - AREA 2

3/16" = 1'-0"

KEYNOTES

NO.	
07 22 16.530S	TYP. 1/2" PER FOOT TAPPERED SUMP AT ROOF DRAIN, SEE DETAIL.
07 54 19.00C0	TYP. ROOF CRICKET.
07 54 19.1106	TYP. COLD ADHESIVE APPLIED, 60 MIL PVC MEMBRAINE ROOFING.
07 71 13.5000	TYP. ALUMNINUM MANUFACTURED COPING SYSTEM, INSTALLED PER MNFR. INSTRUCTIONS.
07 72 33.0000	TYP. SINGLE-LEAF ROOF ACCESS HATCH W/ CURB AND SAFETY RAIL.
10 73 16.5000	TYP. PREMANUFACTURED ALUMINUM CANOPY SYSTEM. PROVIDE SIGNED & SEALED CALCULATIONS/SHOPDRAWINGS COMPLYING W/ STRUCTURAL DESIGN LOADS.
22 14 26.1300	TYP. FACILITY STORM ROOF DRAIN W/ INTRIGAL OVERFLOW, SEE PLUMBING.
23 08 81.1357	TYP. SERVICE CLEARANCES OF PACKAGED ROOFTOP UNIT MAINTAIN UNOBSTRUCTED ACCESS, SEE MECH.
23 22 13.0050	TYP. CONDENSATE PIPING, SEE MECH.
23 34 16.3070	TYP. ROOF TOP CENTRIFUGAL HVAC/EXHAUST FAN ON CURB, SEE MECHANICAL.
23 81 13.R000	TYP. PACKAGED ROOFTOP UNIT, SEE MECH.

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

OKALOOSA COUNTY

FLY VPS

C19-2811- AP Construction of Satellite Concourse 'C'

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AA-C002208
MLM JOB #: TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED ROOF PLAN - AREA 2

BID DOCUMENTS

Drawing No.:

A412

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

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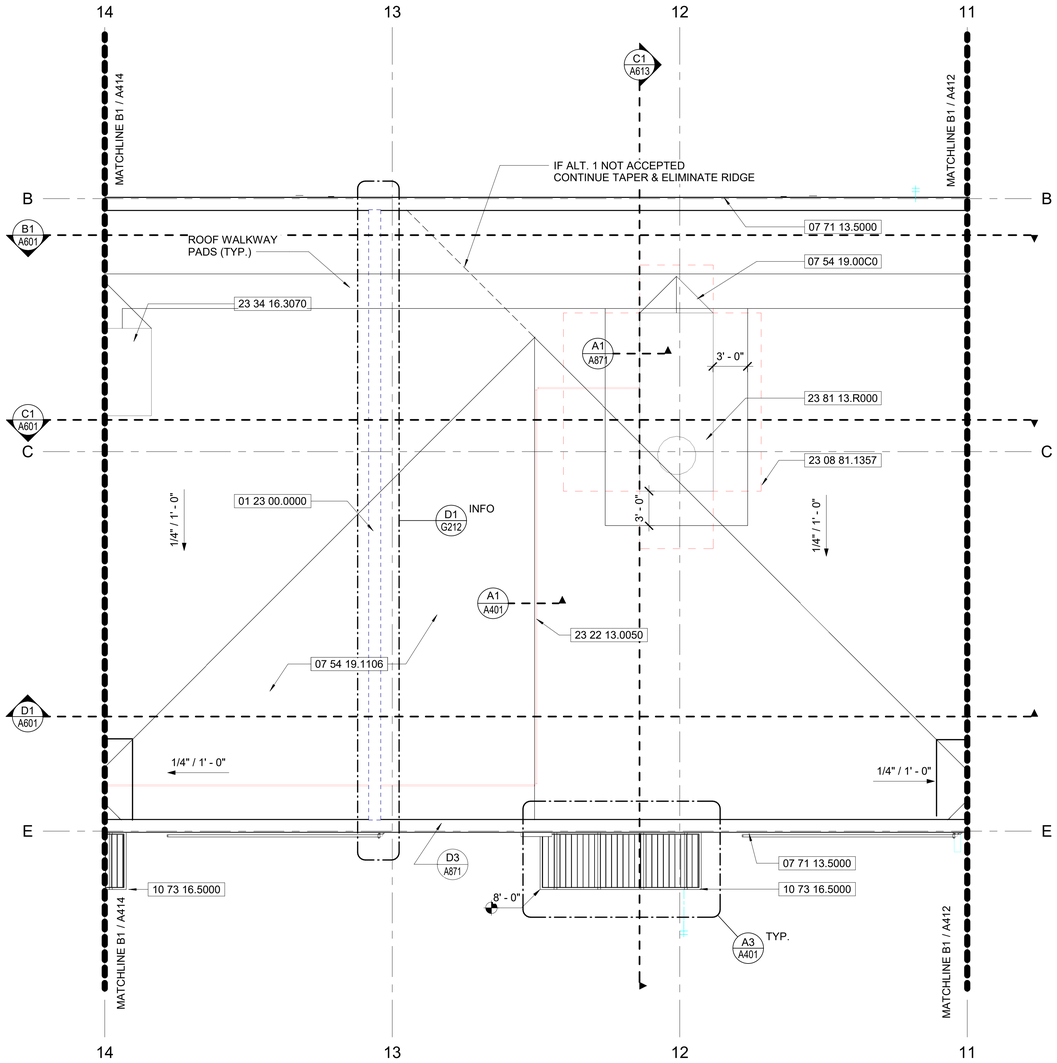

B1 ENLARGED ROOF PLAN - AREA 3

3/16" = 1'-0"

NORTH

KEYNOTES

NO.	
01 23 00.0000	LIMITS OF ALTERNATE WORK, SEE SPECIFICATIONS FOR MORE INFORMATION.
07 54 19.00C0	TYP. ROOF CRICKET.
07 54 19.1106	TYP. COLD ADHESIVE APPLIED, 60 MIL PVC MEMBRAINE ROOFING.
07 71 13.5000	TYP. ALUMNINUM MANUFACTURED COPING SYSTEM, INSTALLED PER MNFR. INSTRUCTIONS.
10 73 16.5000	TYP. PREMANUFACTURED ALUMINUM CANOPY SYSTEM. PROVIDE SIGNED & SEALED CALCULATIONS/SHOPDRAWINGS COMPLYING W/ STRUCTURAL DESIGN LOADS.
23 08 81.1357	TYP. SERVICE CLEARANCES OF PACKAGED ROOFTOP UNIT MAINTAIN UNOBSTRUCTED ACCESS, SEE MECH.
23 22 13.0050	TYP. CONDENSATE PIPING, SEE MECH.
23 34 16.3070	TYP. ROOF TOP CENTRIFUGAL HVAC/EXHAUST FAN ON CURB, SEE MECHANICAL.
23 81 13.R000	TYP. PACKAGED ROOFTOP UNIT, SEE MECH.

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

OKALOOSA COUNTY

FLY VPS

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AA-C002208
MLM JOB #: TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
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Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED ROOF PLAN - AREA 3

BID DOCUMENTS

Drawing No.:

A413

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

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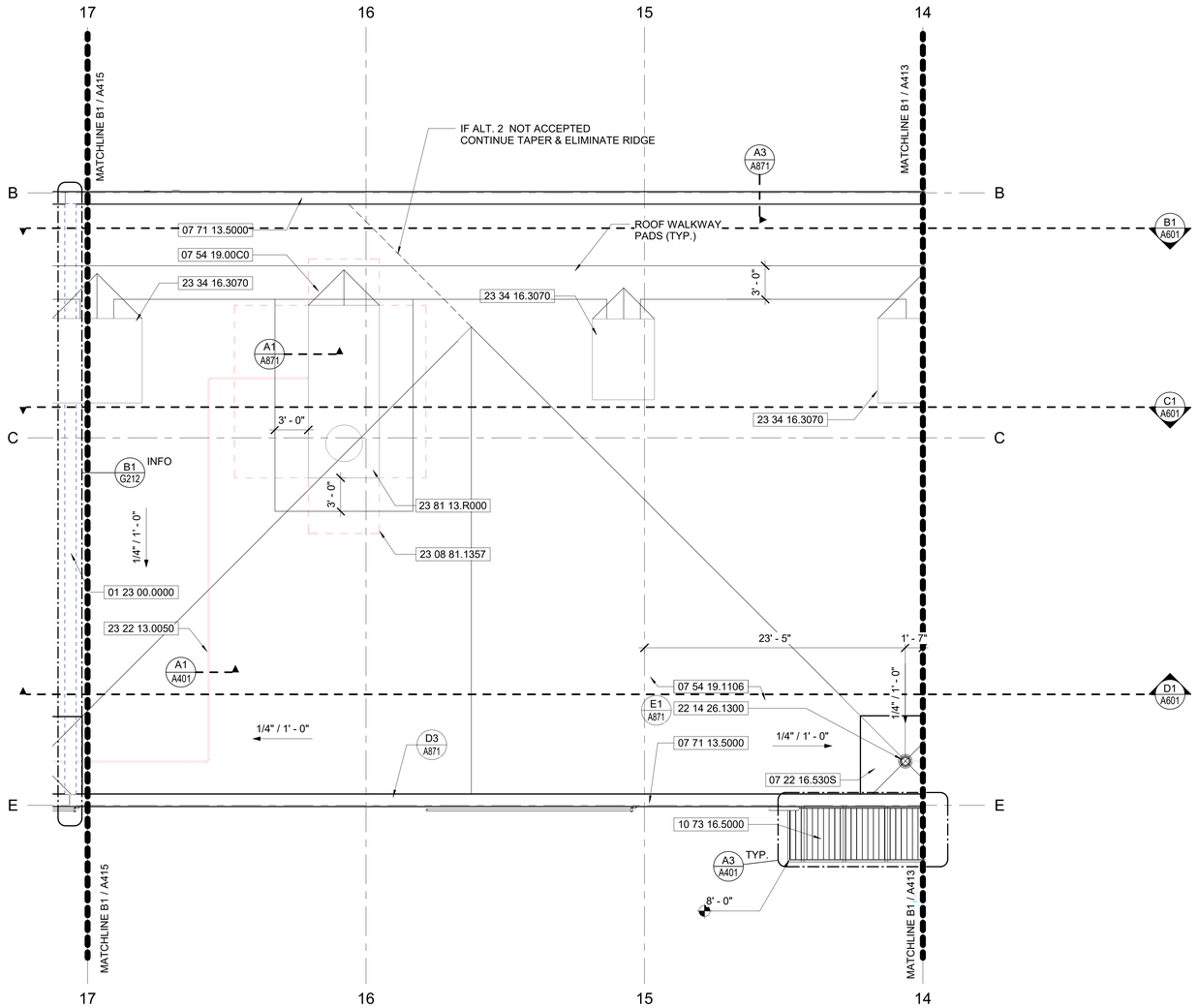

B1 ENLARGED ROOF PLAN - AREA 4

3/16" = 1'-0"

NORTH

KEYNOTES

NO.	
01 23 00.0000	LIMITS OF ALTERNATE WORK, SEE SPECIFICATIONS FOR MORE INFORMATION.
07 22 16.530S	TYP. 1/2" PER FOOT TAPPERED SUMP AT ROOF DRAIN, SEE DETAIL.
07 54 19.00C0	TYP. ROOF CRICKET.
07 54 19.1106	TYP. COLD ADHESIVE APPLIED, 60 MIL PVC MEMBRAINE ROOFING.
07 71 13.5000	TYP. ALUMNINUM MANUFACTURED COPING SYSTEM, INSTALLED PER MNFR. INSTRUCTIONS.
10 73 16.5000	TYP. PREMANUFACTURED ALUMINUM CANOPY SYSTEM. PROVIDE SIGNED & SEALED CALCULATIONS/SHOPDRAWINGS COMPLYING W/ STRUCTURAL DESIGN LOADS.
22 14 26.1300	TYP. FACILITY STORM ROOF DRAIN W/ INTRIGAL OVERFLOW, SEE PLUMBING.
23 08 81.1357	TYP. SERVICE CLEARANCES OF PACKAGED ROOFTOP UNIT MAINTAIN UNOBSTRUCTED ACCESS, SEE MECH.
23 22 13.0050	TYP. CONDENSATE PIPING, SEE MECH.
23 34 16.3070	TYP. ROOF TOP CENTRIFUGAL HVAC/EXHAUST FAN ON CURB, SEE MECHANICAL.
23 81 13.R000	TYP. PACKAGED ROOFTOP UNIT, SEE MECH.

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction of Satellite Concourse 'C'

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AA-C002208
MLM JOB #: TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED ROOF PLAN - AREA 4

BID DOCUMENTS

Drawing No.:

A414

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

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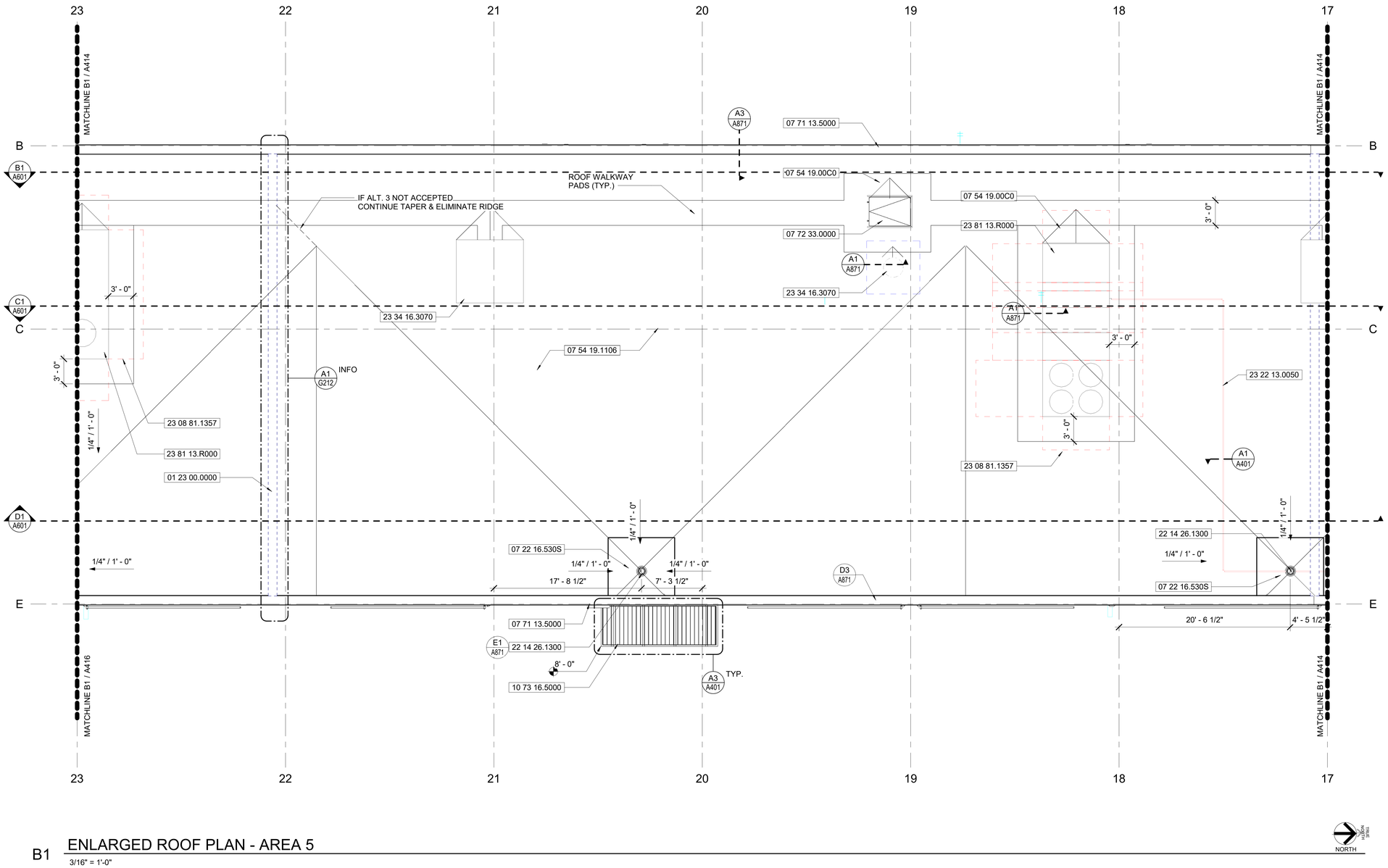

B1 ENLARGED ROOF PLAN - AREA 5

3/16" = 1'-0"

KEYNOTES

NO.	
01 23 00.0000	LIMITS OF ALTERNATE WORK, SEE SPECIFICATIONS FOR MORE INFORMATION.
07 22 16.530S	TYP. 1/2" PER FOOT TAPPERED SUMP AT ROOF DRAIN, SEE DETAIL.
07 54 19.00C0	TYP. ROOF CRICKET.
07 54 19.1106	TYP. COLD ADHESIVE APPLIED, 60 MIL PVC MEMBRAINE ROOFING.
07 71 13.5000	TYP. ALUMNINUM MANUFACTURED COPING SYSTEM, INSTALLED PER MNFR. INSTRUCTIONS.
07 72 33.0000	TYP. SINGLE-LEAF ROOF ACCESS HATCH W/ CURB AND SAFETY RAIL.
10 73 16.5000	TYP. PREMANUFACTURED ALUMINUM CANOPY SYSTEM. PROVIDE SIGNED & SEALED CALCULATIONS/SHOPDRAWINGS COMPLYING W/ STRUCTURAL DESIGN LOADS.
22 14 26.1300	TYP. FACILITY STORM ROOF DRAIN W/ INTRIGAL OVERFLOW, SEE PLUMBING.
23 08 81.1357	TYP. SERVICE CLEARANCES OF PACKAGED ROOFTOP UNIT MAINTAIN UNOBSTRUCTED ACCESS, SEE MECH.
23 22 13.0050	TYP. CONDENSATE PIPING, SEE MECH.
23 34 16.3070	TYP. ROOF TOP CENTRIFUGAL HVAC/EXHAUST FAN ON CURB, SEE MECHANICAL.
23 81 13.R000	TYP. PACKAGED ROOFTOP UNIT, SEE MECH.

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

OKALOOSA COUNTY

FLY VPS

C19-2811- AP Construction of Satellite Concourse 'C'

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MAITLAND, FL 32751
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WWW.MLM-MARTIN.COM
AA-C002208
MLM JOB #: TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED ROOF PLAN - AREA 5

BID DOCUMENTS

Drawing No.:

A415

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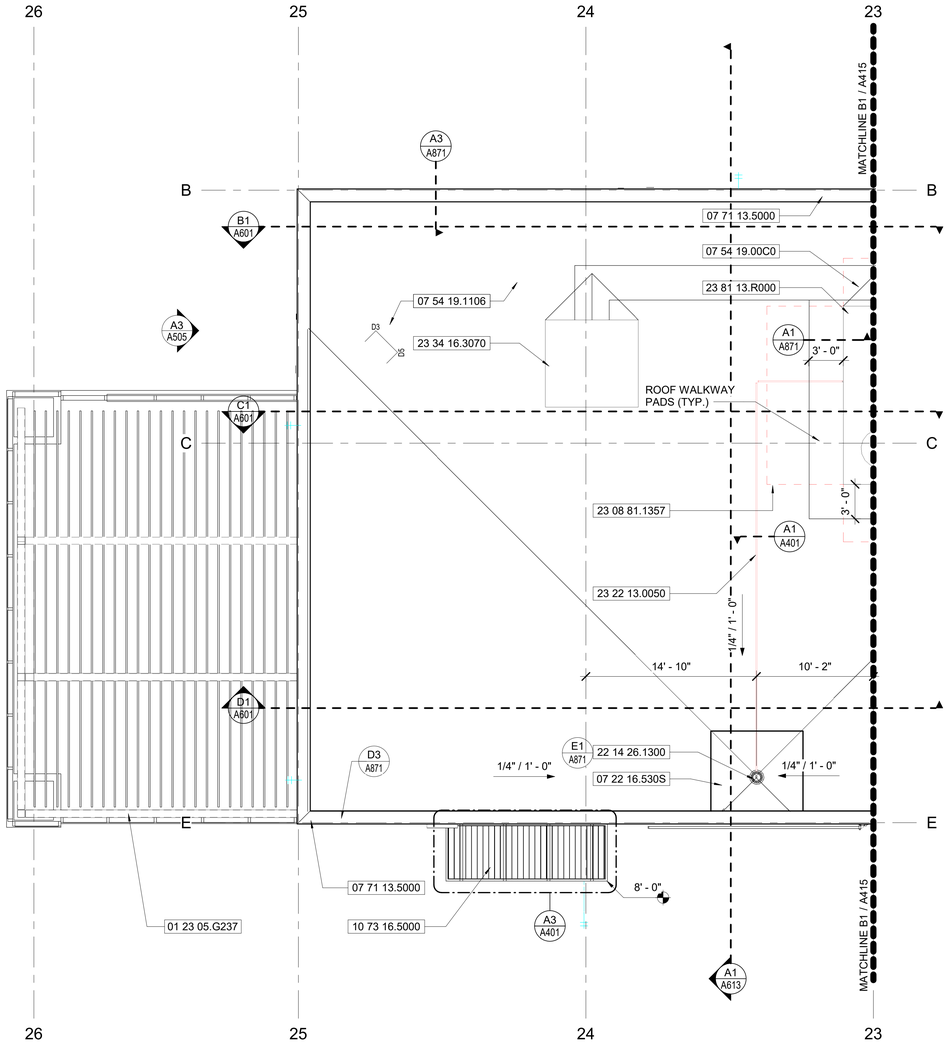
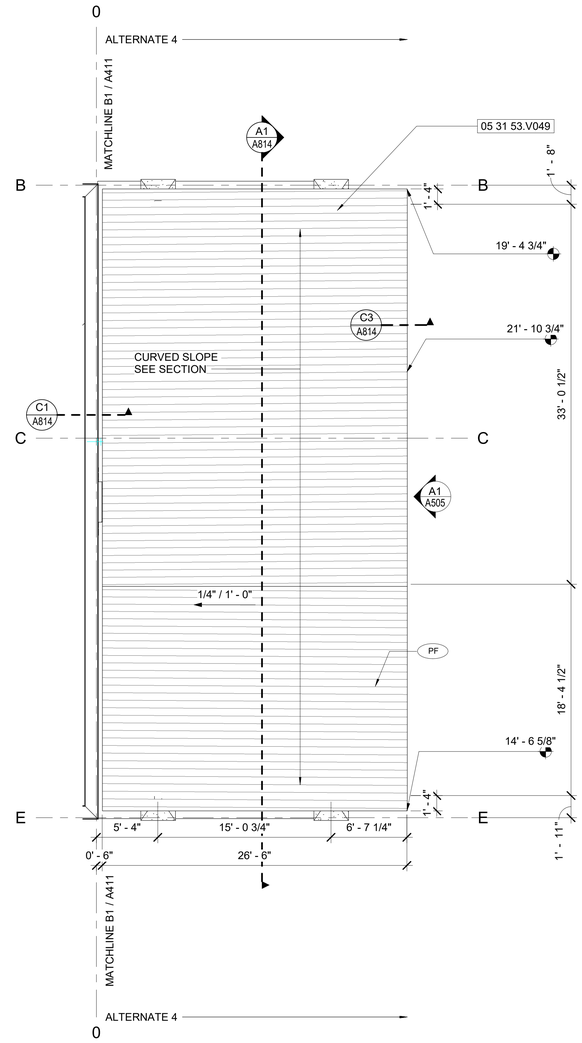


B1 ENLARGED ROOF PLAN - AREA 6

3/16" = 1'-0"



B4 ENLARGED ALTERNATE 4 ROOF PLAN

3/16" = 1'-0"

KEYNOTES

NO.	
01 23 05.G237	TYP. ALTERNATE 5 EXTERIOR CONCESSIONS PLAZA WORK.
05 31 53.V049	TYP. 4" DOVETAIL G-90 GALV. STEEL ARCHITECTURALLY EXPOSED DECK. BASIS OF DESIGN: EPIC TORIS 4 - CANOPY.
07 22 16.530S	TYP. 1/2" PER FOOT TAPPERED SUMP AT ROOF DRAIN, SEE DETAIL.
07 54 19.00C0	TYP. ROOF CRICKET.
07 54 19.1106	TYP. COLD ADHESIVE APPLIED, 60 MIL PVC MEMBRAINE ROOFING.
07 71 13.5000	TYP. ALUMNINUM MANUFACTURED COPING SYSTEM, INSTALLED PER MNFR. INSTRUCTIONS.
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22 14 26.1300	TYP. FACILITY STORM ROOF DRAIN W/ INTRIGAL OVERFLOW, SEE PLUMBING.
23 08 81.1357	TYP. SERVICE CLEARANCES OF PACKAGED ROOFTOP UNIT MAINTAIN UNOBSTRUCTED ACCESS, SEE MECH.
23 22 13.0050	TYP. CONDENSATE PIPING, SEE MECH.
23 34 16.3070	TYP. ROOF TOP CENTRIFUGAL HVAC/EXHAUST FAN ON CURB, SEE MECHANICAL.
23 81 13.R000	TYP. PACKAGED ROOFTOP UNIT, SEE MECH.

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

C19-2811- AP
Construction of Satellite Concourse 'C'

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AA-C002208
OLM JOB # TYP. PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED ROOF PLAN - AREA 6

BID DOCUMENTS

Drawing No.:

A416

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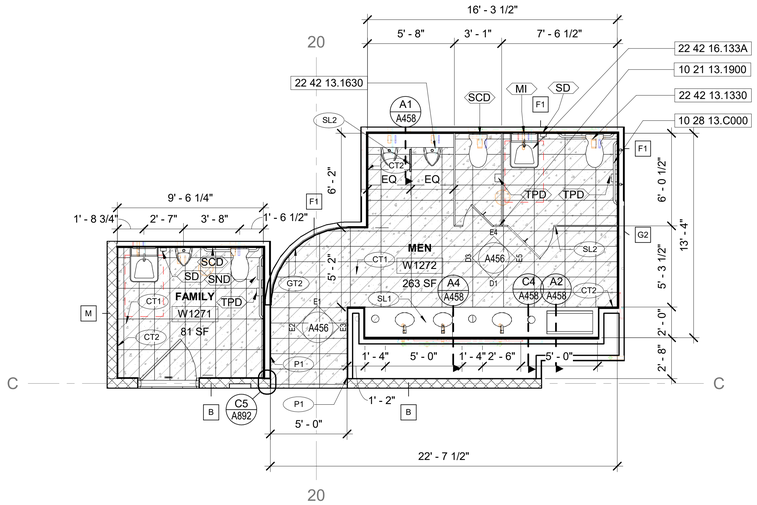
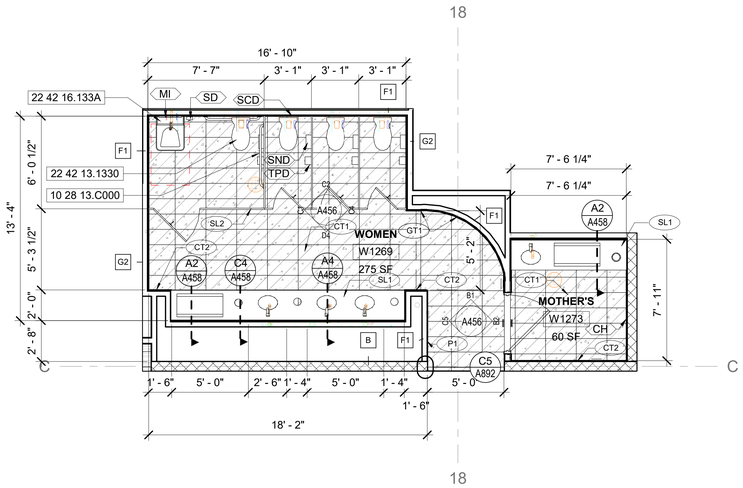


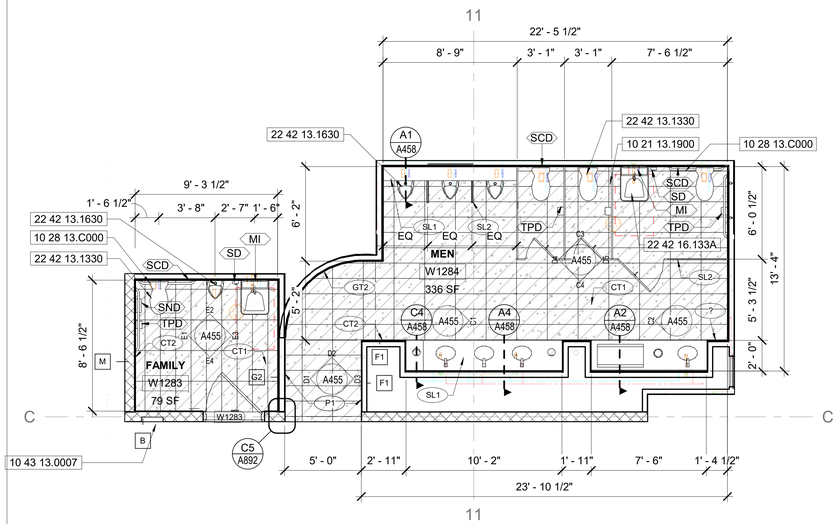
D1 ENLARGED RESTROOM MEN ALTERNATE 2 PLAN

1/4" = 1'-0"



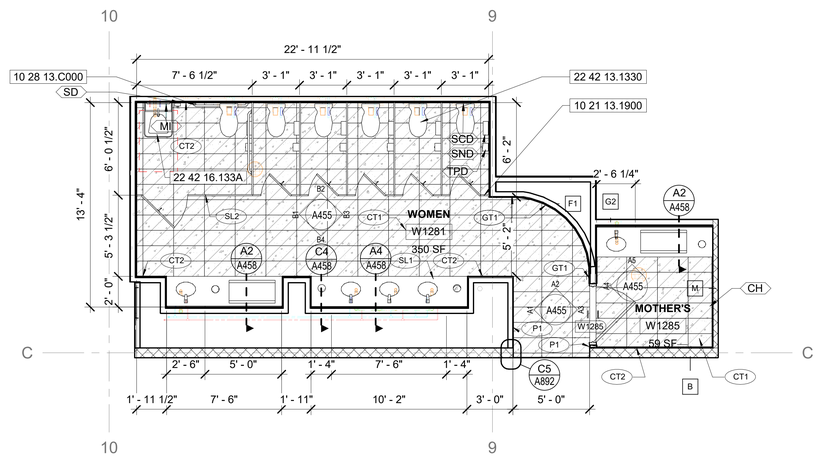
D3 ENLARGED RESTROOM WOMEN ALTERNATE 2 PLAN

1/4" = 1'-0"



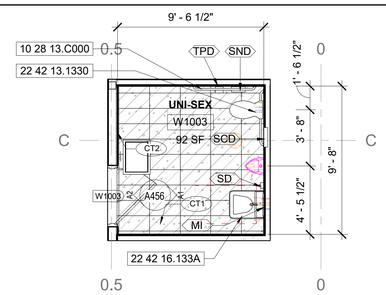
B1 ENLARGED MEN RESTROOM PLAN BASE BID

1/4" = 1'-0"



B3 ENLARGED WOMEN RESTROOM PLAN BASE BID

1/4" = 1'-0"



A1 ENLARGED RESTROOM PLAN (SSCP)

1/4" = 1'-0"

KEYNOTES

NO.	
10 21 13.1900	TYP. PLASTIC TOILET COMPARTMENT.
10 28 13.C000	TYPICAL GRAB BAR
10 43 13.0007	TYP. WALL CABINENT MOUNTED AUTOMATIC ELECTRONIC DEFIBRILLATOR (AED).
22 42 13.1330	TYP. FLUSH VALVE WALL MOUNTED WATER CLOSET, SEE PLUMBING.
22 42 13.1630	TYP. FLUSH VALVE URINAL, SEE PLUMBING.
22 42 16.133A	TYP. ADA, WALL MOUNTED LAVATORY, SEE PLUMBING.

NOTES

1. REFER TO **AL641** FOR PARTITION TYPES
2. ALL PARTITIONS ARE DIMENSIONED FROM FACE OF FINISH TO FACE OF FINISH U.O.N.
3. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET SERIES **A711**
4. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
5. REFER TO **A457** FOR ACCESSORIES INFORMATION. X
6. REFER TO **A458** FOR COUNTERTOP AND OTHER RESTROOM DETAILS THAT APPLY TYPICALLY TO ALL LOCATIONS WITH IN RESTROOMS.

MATERIALS LEGEND

? MATERIAL CODE SYMBOL: SEE **AF712** FOR DEFINITIONS

CT1

CT2

P1

GT1 ALTERNATE 7 REPLACE WITH CT2

GT2 ALTERNATE 7 REPLACE WITH CT2

SCALE: 1/4" = 1'-0"

0 1' 2' 4' 8'

OKALOOSA COUNTY

FLY VPS

C19-2811- AP Construction of Satellite Concourse 'C'

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FL AR-98279

SEAL

Revisions

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Drawing Scale:	1/4" = 1'-0"

Drawing Title:

ENLARGED RESTROOM PLAN

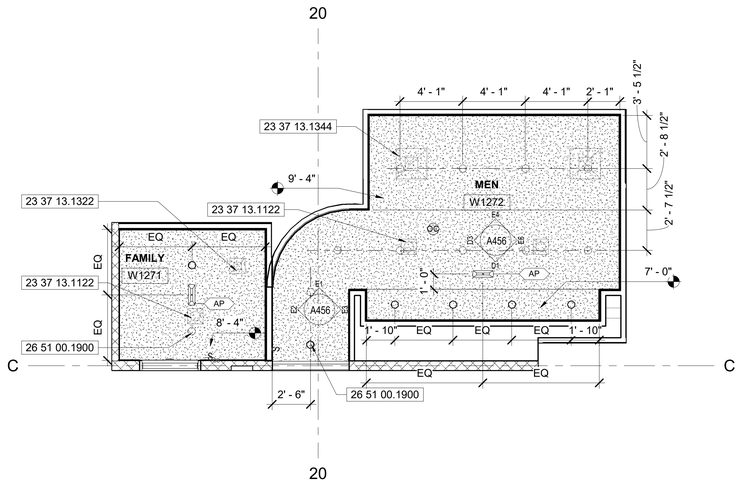
BID DOCUMENTS

Drawing No.:

A452

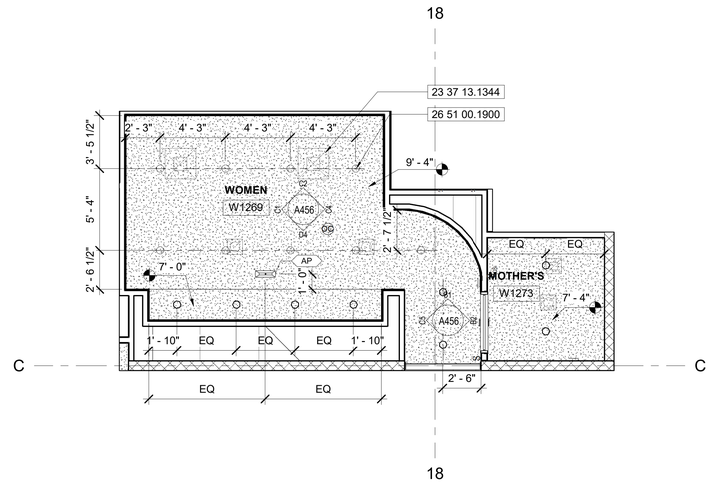
BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

12/8/2020 5:39:13 PM



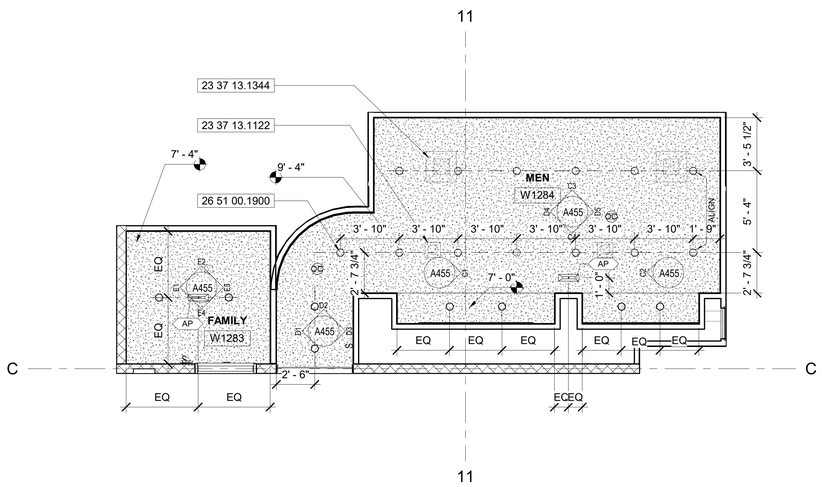
C1 ENLARGED MEN RESTROOM ALTERNATE 2 CEILING PLAN

1/4" = 1'-0"



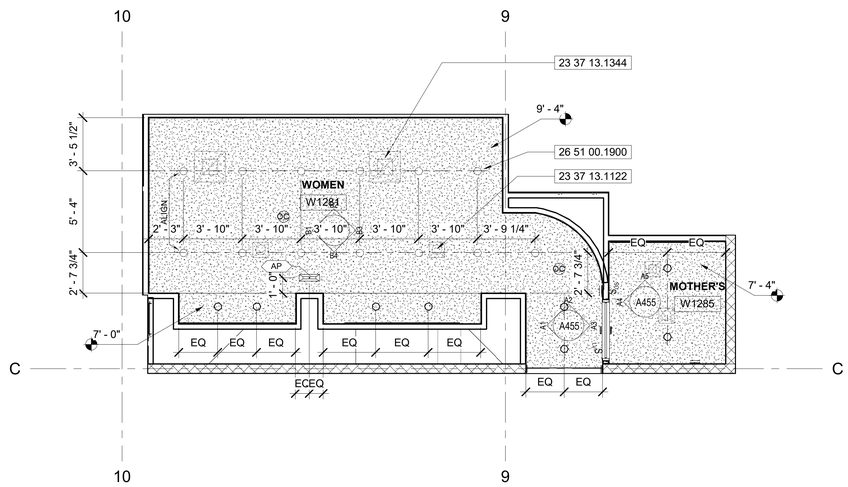
C3 ENLARGED WOMEN RESTROOM ALTERNATE CEILING PLAN

1/4" = 1'-0"



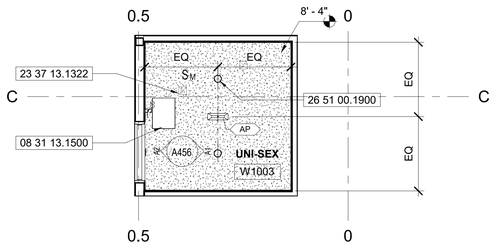
B1 ENLARGED MEN RESTROOM CEILING PLAN BASE BID

1/4" = 1'-0"



B3 ENLARGED WOMEN RESTROOM CEILING PLAN BASE BID

1/4" = 1'-0"



A1 ENLARGED RESTROOM CEILING PLAN (SSCP)

1/4" = 1'-0"

KEYNOTES

NO.	
08 31 13.1500	TYPICAL GALV. MTL. CEILING ACCESS DOOR, PAINT TO MATCH SURROUNDING SURFACE.
23 37 13.1122	TYP. 1' X 1' HVAC SUPPLY DIFFUSER, SEE MECH.
23 37 13.1322	TYP. 1' X 1' HVAC EXHAUST REGISTER, SEE MECH.
23 37 13.1344	TYP. 2'X2' HVAC EXHAUST REGISTER, SEE MECH.
26 51 00.1900	TYP. RECESSED CEILING MOUNTED LED "CAN", SEE ELECTRICAL FOR FIXTURE TYPE. PROVIDE MUD FLANGE FOR GWB INSTALL.

NOTES

1. REFER TO **AL641** FOR PARTITION TYPES
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3. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET SERIES **A711**
4. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
5. REFER TO **A457** FOR ACCESSORIES INFORMATION. X
6. REFER TO **A458** FOR COUNTERTOP AND OTHER RESTROOM DETAILS THAT APPLY TYPICALLY TO ALL LOCATIONS WITH IN RESTROOMS.

MATERIALS LEGEND

? MATERIAL CODE SYMBOL: SEE **AF712** FOR DEFINITIONS

CT1

CT2

P1

GT1 ALTERNATE 7 REPLACE WITH CT2

GT2 ALTERNATE 7 REPLACE WITH CT2

SCALE: 1/4" = 1'-0"

0 1' 2' 4' 8'

OKALOOSA COUNTY

FLY VPS

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WWW.MLM-MARTIN.COM
AA-C002208
MLM JOB #: TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	1/4" = 1'-0"

Drawing Title:

ENLARGED RESTROOM CEILING PLAN

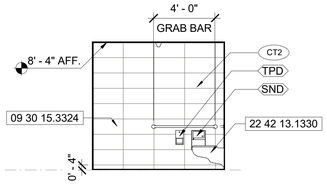
BID DOCUMENTS

Drawing No.:

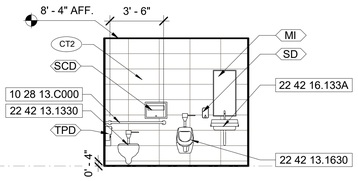
A453

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

12/8/2020 5:39:26 PM



E1 FAMILY RR INT. ELEV.
1/4" = 1'-0"



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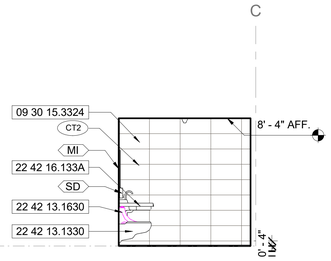

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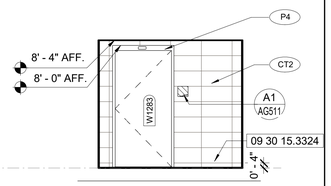

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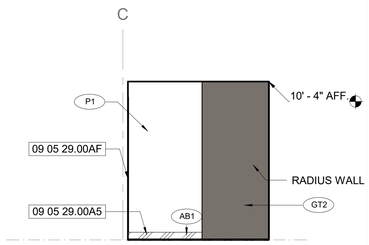

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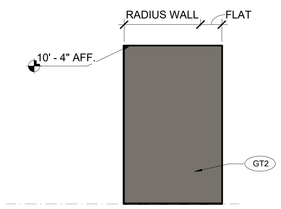
1/4" = 1'-0"



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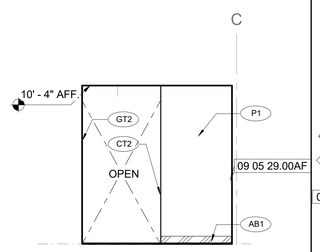
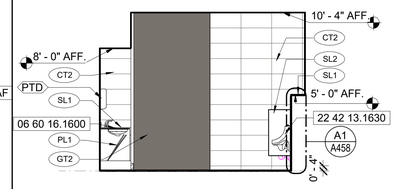
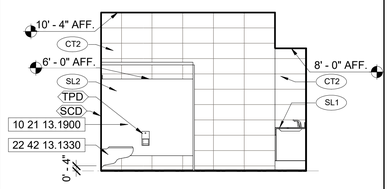
1/4" = 1'-0"



D3 MENS VEST INT.ELEV
1/4" = 1'-0"



D4 MENS ROOM INT.ELEV
1/4" = 1'-0"



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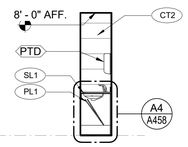
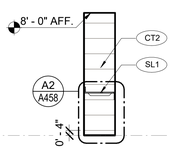
1/4" = 1'-0"



C1 VANITY RETURN
1/4" = 1'-0"



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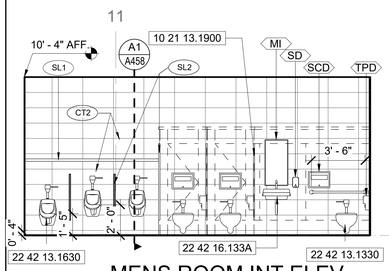
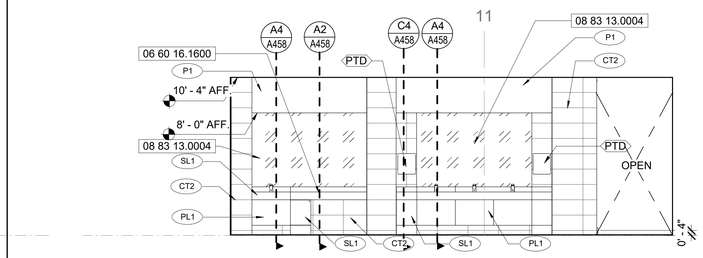
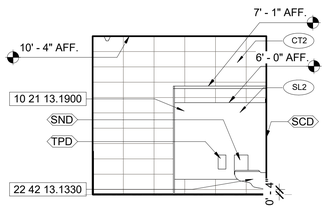
1/4" = 1'-0"



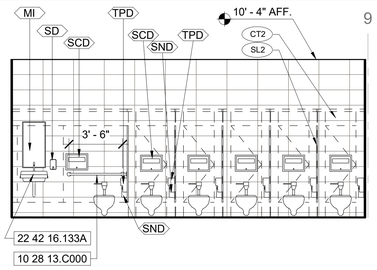
C3 MENS ROOM INT.ELEV
1/4" = 1'-0"



C4 MENS ROOM INT.ELEV
1/4" = 1'-0"



B1 WOMENS ROOM INT.ELEV
1/4" = 1'-0"



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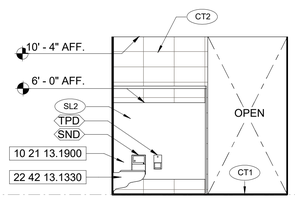
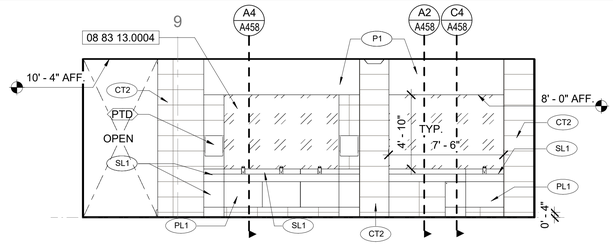
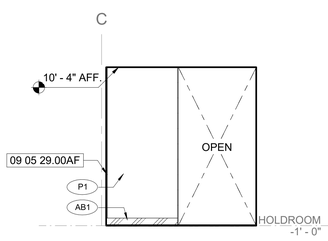
1/4" = 1'-0"



B3 WOMENS ROOM INT.ELEV
1/4" = 1'-0"



B4 WOMENS ROOM INT.ELEV
1/4" = 1'-0"



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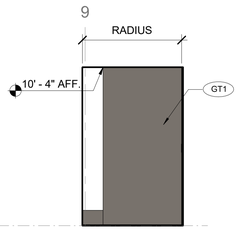
1/4" = 1'-0"



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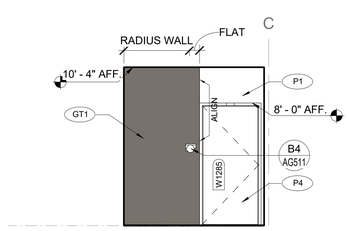
1/4" = 1'-0"



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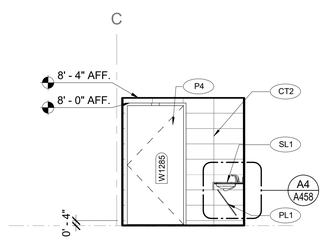
1/4" = 1'-0"



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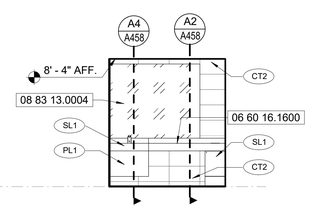
1/4" = 1'-0"



A5 MOTHERS ROOM INT. ELEV
1/4" = 1'-0"

KEYNOTES

NO.	
06 60 16.1600	TYP. SOLID SURFACING COUNTERTOPS.
08 83 13.0004	TYP. 1/4" TEMPERED MIRROR GLAZING, WALL MOUNTED.
09 05 29.00A5	TYP. ALUMINUM GYPSUM BOARD REVEAL BASE ACCESSORY.
09 05 29.00AF	TYP. ALUMINUM GYPSUM BOARD 'F' REVEAL ACCESSORY.
09 30 15.3324	TYP. 12" X 24" RECTIFIED, PROCELIAN STONE WALL TILING.
10 21 13.1900	TYP. PLASTIC TOILET COMPARTMENT.
10 28 13.C000	TYPICAL GRAB BAR
22 42 13.1330	TYP. FLUSH VALVE WALL MOUNTED WATER CLOSET, SEE PLUMBING.
22 42 13.1630	TYP. FLUSH VALVE URINAL, SEE PLUMBING.
22 42 16.133A	TYP. ADA, WALL MOUNTED LAVATORY, SEE PLUMBING.

NOTES

1. REFER TO **AL641** FOR PARTITION TYPES
2. ALL PARTITIONS ARE DIMENSIONED FROM FACE OF FINISH TO FACE OF FINISH U.O.N.
3. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET SERIES **A711**
4. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
5. REFER TO **A457** FOR ACCESSORIES INFORMATION. (X)
6. REFER TO **A458** FOR COUNTERTOP AND OTHER RESTROOM DETAILS THAT APPLY TYPICALLY TO ALL LOCATIONS WITH IN RESTROOMS.

MATERIALS LEGEND

(?) MATERIAL CODE SYMBOL: SEE **AF712** FOR DEFINITIONS

CT1

CT2

P1

GT1 — ALTERNATE 7 REPLACE WITH CT2

GT2 — ALTERNATE 7 REPLACE WITH CT2

SCALE: 1/4" = 1'-0"
0 1' 2' 4' 8'

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
SUITE 107
MAITLAND, FL 32751
407.897.6764 (VOICE)
407.894.1338 (FAX)
WWW.MLM-MARTIN.COM
AA-C002208
ULM JOB # TYPE: PROPERTY
MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	1/4" = 1'-0"

Drawing Title:

RESTROOM INTERIOR ELEVATIONS

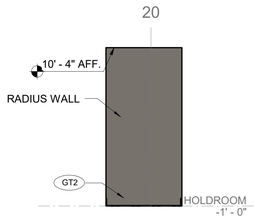
BID DOCUMENTS

Drawing No.:

A455

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

12/8/2020 5:39:52 PM



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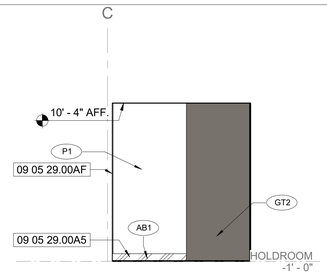
1/4" = 1'-0"



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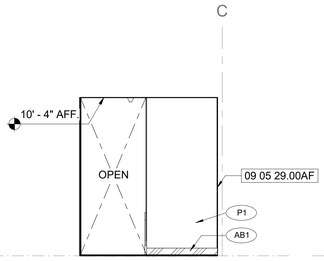

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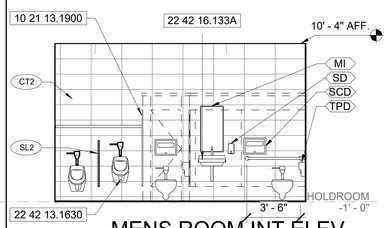

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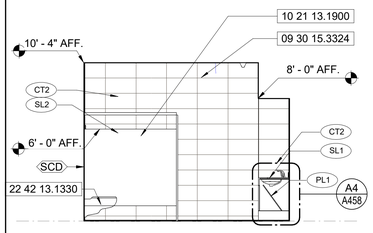
1/4" = 1'-0"



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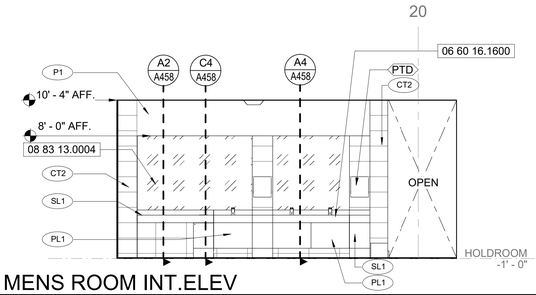

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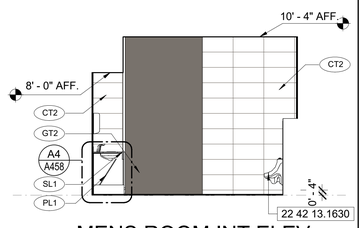
1/4" = 1'-0"



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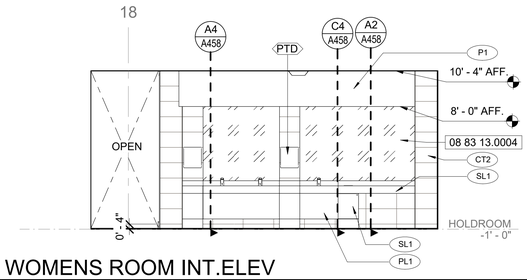

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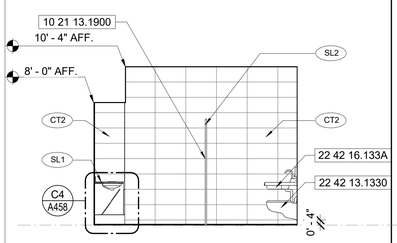
1/4" = 1'-0"



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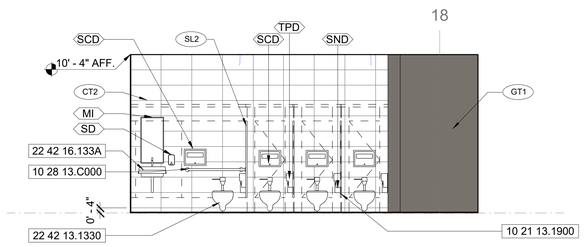
1/4" = 1'-0"



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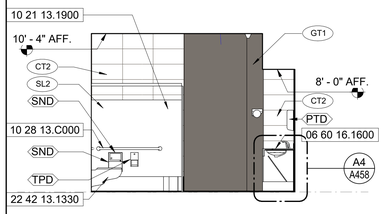
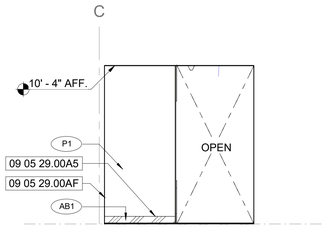
1/4" = 1'-0"



C4 WOMENS ROOM INT.ELEV
1/4" = 1'-0"



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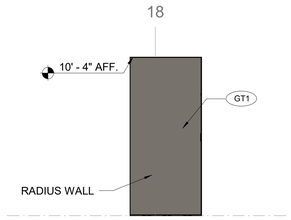
1/4" = 1'-0"



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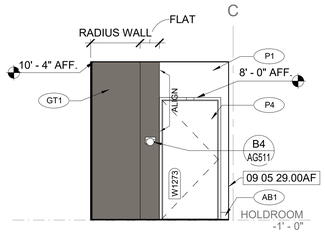
1/4" = 1'-0"



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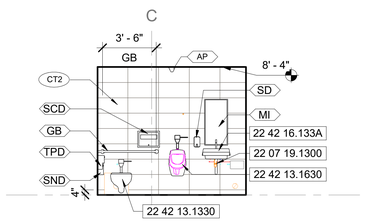
1/4" = 1'-0"



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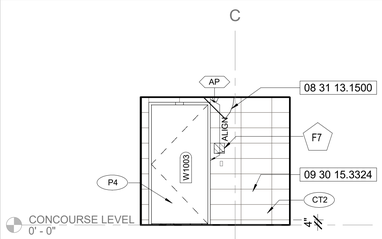

A2 SSCP RR INT. ELEV
1/4" = 1'-0"

KEYNOTES

NO.	
06 60 16.1600	TYP. SOLID SURFACING COUNTERTOPS.
08 31 13.1500	TYPICAL GALV. MTL. CEILING ACCESS DOOR, PAINT TO MATCH SURROUNDING SURFACE.
08 83 13.0004	TYP. 1/4" TEMPERED MIRROR GLAZING, WALL MOUNTED.
09 05 29.00A5	TYP. ALUMINUM GYPSUM BOARD REVEAL BASE ACCESSORY.
09 05 29.00AF	TYP. ALUMINUM GYPSUM BOARD 'F' REVEAL ACCESSORY.
09 30 15.3324	TYP. 12" X 24" RECTIFIED, PROCELIAN STONE WALL TILING.
10 21 13.1900	TYP. PLASTIC TOILET COMPARTMENT.
10 28 13.C000	TYPICAL GRAB BAR
22 07 19.1300	TYP. WRAP SINK P-TRAP AND EXPOSED SANITARY DRAIN LINES WITH PIPE INSULATION.
22 42 13.1330	TYP. FLUSH VALVE WALL MOUNTED WATER CLOSET, SEE PLUMBING.
22 42 13.1630	TYP. FLUSH VALVE URINAL, SEE PLUMBING.
22 42 16.133A	TYP. ADA, WALL MOUNTED LAVATORY, SEE PLUMBING.

NOTES

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MATERIALS LEGEND

(?) MATERIAL CODE SYMBOL: SEE **AF712** FOR DEFINITIONS

CT1

CT2

P1

GT1 ALTERNATE 7 REPLACE WITH CT2

GT2 ALTERNATE 7 REPLACE WITH CT2

SCALE: 1/4" = 1'-0"
0 1' 2' 4' 8'

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
SUITE 107
MAITLAND, FL 32751
407.897.6764 (VOICE)
407.894.1338 (FAX)
WWW.MLM-MARTIN.COM
AA-C002208
ALM JOB #: TYPE: PROPERTY
MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	1/4" = 1'-0"

Drawing Title:

RESTROOM INTERIOR ELEVATIONS

BID DOCUMENTS

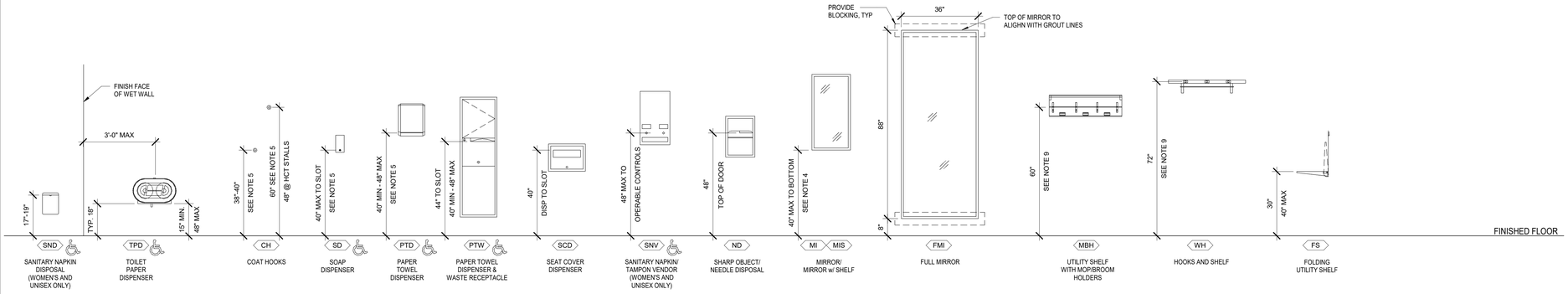
Drawing No.:

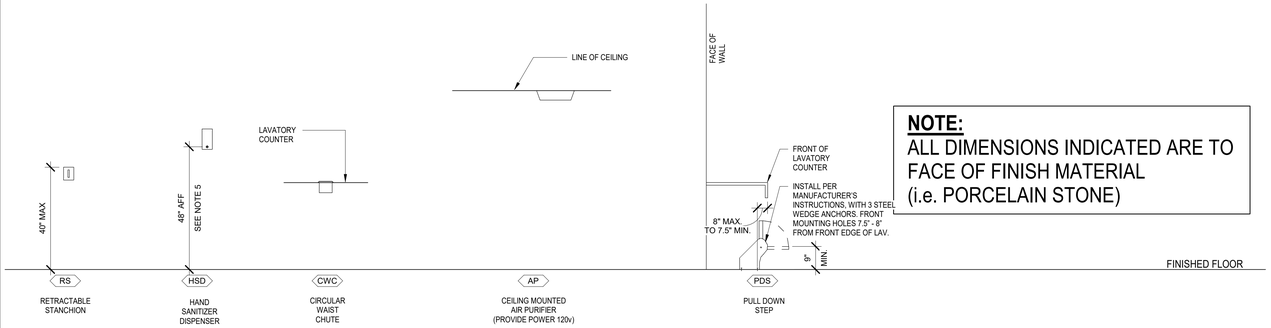
A456

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

12/8/2020 5:40:15 PM

TOILET ACCESSORY ACCESSORY MOUNTING DIAGRAM

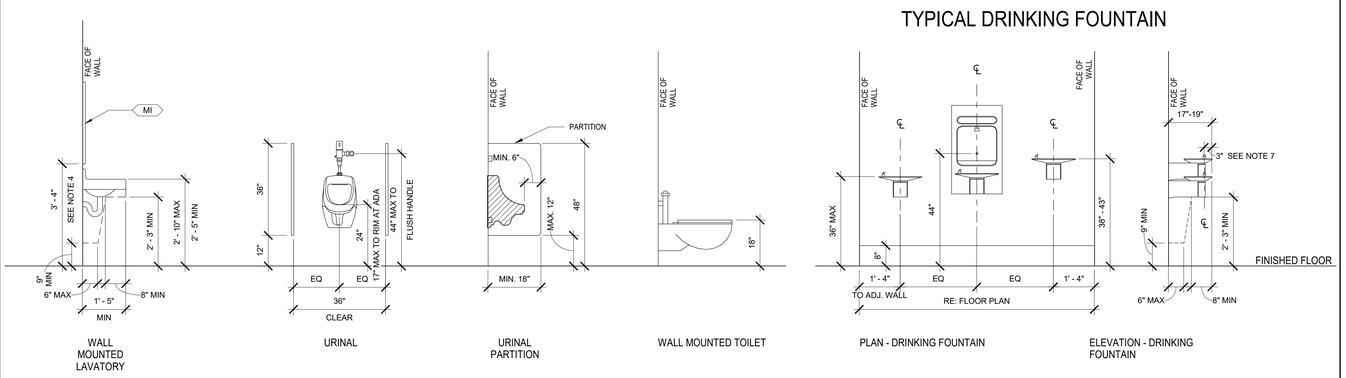




NOTE:
ALL DIMENSIONS INDICATED ARE TO FACE OF FINISH MATERIAL (i.e. PORCELAIN STONE)

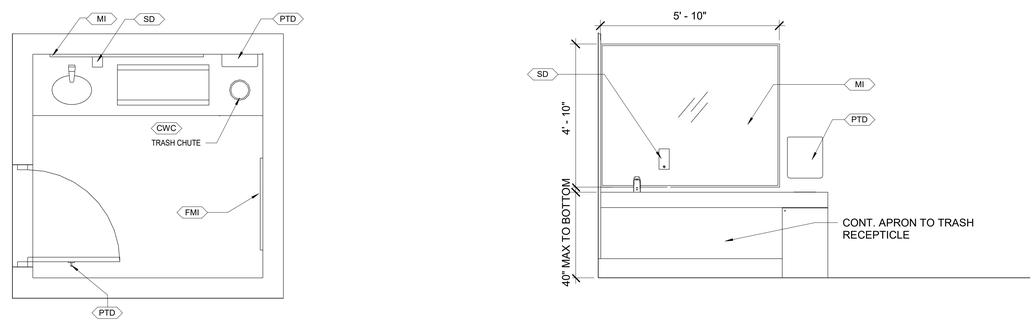
Key	Description	Manufacturer	Product No.
GB	Grab Bar – 42" 1-1/2" diameter stainless steel	Bradley Bobrick	812 B-6806
GB	Grab Bar – 36" 1-1/2" diameter stainless steel	Bradley Bobrick	812 B-6806
	Mop/broom holder – 4 holders	Bradley	9954
SCD	Seat cover dispenser - recessed	Bradley Bobrick	584 B-301
MI	Tilted glass mirror with shelf - 18"x36"	Bradley Bobrick	7405 B-166
MI	Mirror – accessible	Bobrick	B-290
SD	Soap dispenser – recessed	Bobrick	B-306
SD	Soap dispenser – surface (wall) mounted	Bobrick	B-2111
TPD	Toilet paper dispenser, surface mounted double 9" rolls	Bradley Bobrick	5425 B-2892
SND	Sanitary napkin disposal – surface mounted	Bradley Bobrick	4721/4722 - 15 B-254
SND	Sanitary napkin disposal – recessed	Bradley Bobrick	4732-1015 B-353
SND	Sanitary napkin disposal – partition mounted dual access	Bradley Bobrick	4721-15 B-354
SNV	Sanitary napkin vendor – surface mounted	Bradley Bobrick	4A20 (FREE) B-2706 50
SNV	Sanitary napkin vendor – recessed	Bradley Bobrick	402 B-3706-50
PTD	Automated paper towel dispenser and waste receptacle– recessed, 12 gallon	Georgia Pacific, enMotion	59491 with 59466
PTD	Automated paper towel dispenser – recessed	Georgia Pacific	59466 59471
PTD	Paper towel dispenser – non-automatic, surface mounted	Georgia Pacific	59466
	Fold down utility shelf - surface mounted	Bradley Bobrick	790 B-287
	Circular waste chute - 6" diameter	Bradley Bobrick	P10 – 696 B-352
	Retractable stanchion – recessed, full opening or 10 ft	Visiontron	700
	Hooks and shelf - 6	Bradley Bobrick	9124 B-298 shelf B-985 hook strip
MI	Mirror, custom – full size	Bradley Bobrick	705 series B-290 2472
WH	Robe hook - single	Bradley Bobrick	931 B-76717
WH	Robe hook - double	Bradley Bobrick	932 B-76727
	Garment rack/hooks – surface mounted with 3 hooks	Ex-Cell Kaiser	703 SA or 724 CHR
PDS	Pull down step	Step & Wash	SNW-SS 975B
AP	Ionizer (1 per 8 sanitary fixtures)	Biozone	AC series

FIXTURE AND PARTITION MOUNTING DIAGRAM



TYPICAL DRINKING FOUNTAIN

TYPICAL MOTHER'S ROOM CONFIGURATION



PLAN - TYPICAL MOTHER'S ROOM

ELEVATION - MOTHER'S ROOM

OKALOOSA COUNTY

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C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
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AA-C002208
ALM SOB & TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
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Issue Date:	30-NOV-2020
Drawing Scale:	NO SCALE

Drawing Title:

RESTROOM ACCESSORIES

BID DOCUMENTS

Drawing No.:

A457

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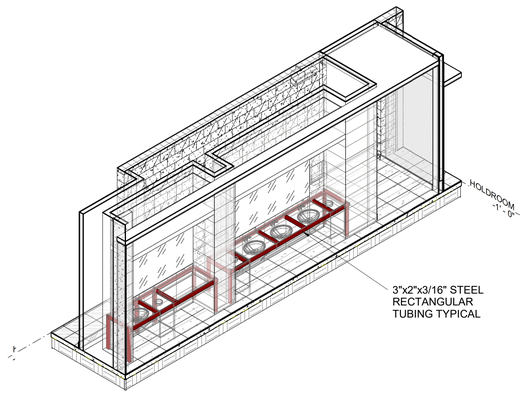
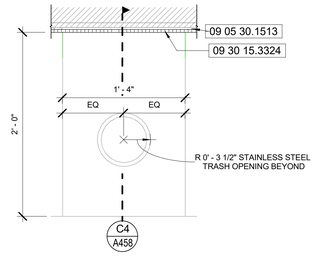
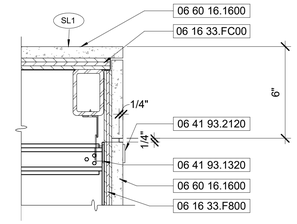


D1 VANITY FRAMING



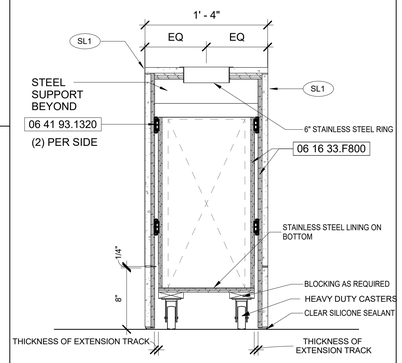
E4 CHUTE TRIM

1 1/2" = 1'-0"



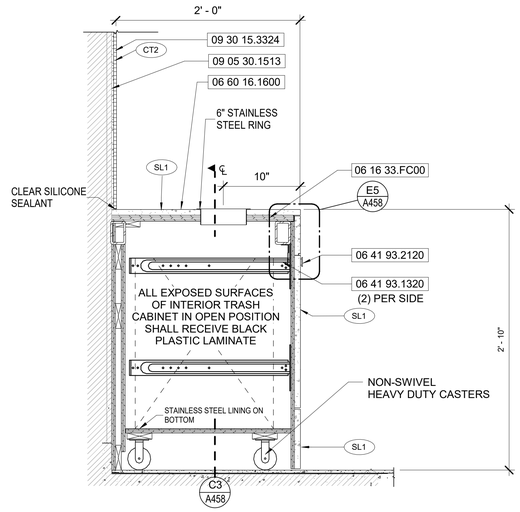
E5 LOCK DETAIL

3" = 1'-0"



C3 PULLOUT TRASH

1 1/2" = 1'-0"

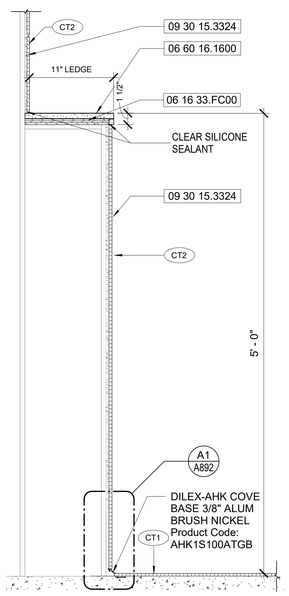


C4 TRASH RECEPTICAL

1 1/2" = 1'-0"

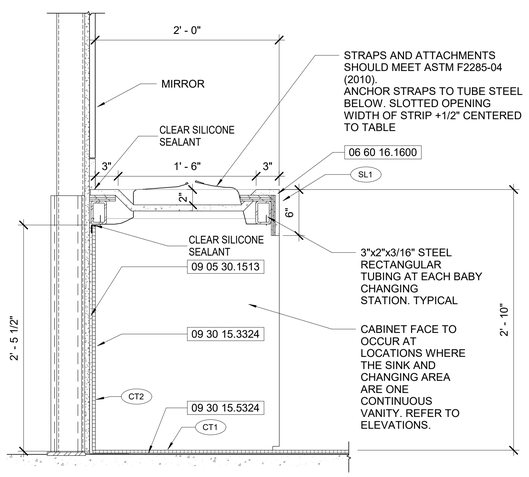
KEYNOTES

NO.	
06 16 33.F800	TYP. 1/2" FR PLYWOOD.
06 16 33.FC00	TYP. 3/4" FR PLYWOOD.
06 41 16.1450	TYP. PLASTIC LAMINATE CLAD ACCESS PANEL CASEWORK.
06 41 93.1100	TYP. FULL LENGTH PIANO HINGE.
06 41 93.1320	TYP. HEAVY DUTY FULL EXTENSION STAINLESS STEEL SLIDE CASEWORK HARDWARE.
06 41 93.2120	TYP. STAINLESS STEEL CASEWORK LOCK HADRWARE.
06 60 16.1600	TYP. SOLID SURFACING COUNTERTOPS.
08 83 13.W100	TYP. FULL HEIGHT WALL MOUNTED MIRROR
09 05 30.1513	TYP. PROCELIAN STONE TILE THIN-SET MATERIAL, SEE SPECIFICATIONS.
09 30 15.3324	TYP. 12" X 24" RECTIFIED, PROCELIAN STONE WALL TILING.
09 30 15.5324	TYP. 12" X 24" RECTIFIED, PROCELIAN STONE FLOOR TILING.
22 07 19.1300	TYP. WRAP SINK P-TRAP AND EXPOSED SANITARY DRAIN LINES WITH PIPE INSULATION.



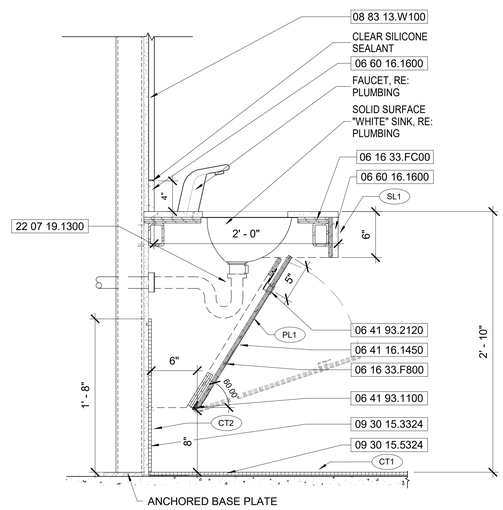
A1 URINAL SHELF

1 1/2" = 1'-0"



A2 BABY CHANGING CASEWORK

1 1/2" = 1'-0"



A4 RESTROOM VANITY

1 1/2" = 1'-0"

SCALE: 1/4" = 1'-0"
0 1' 2' 4' 8'

SCALE: 3" = 1'-0"
0 1" 2" 4' 8"

SCALE: 1 1/2" = 1'-0"
0 2" 4" 8" 16"

C19-2811- AP
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MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	AS NOTED

Drawing Title:

RESTROOM DETAILS

BID DOCUMENTS

Drawing No.:

A458

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KEYNOTES

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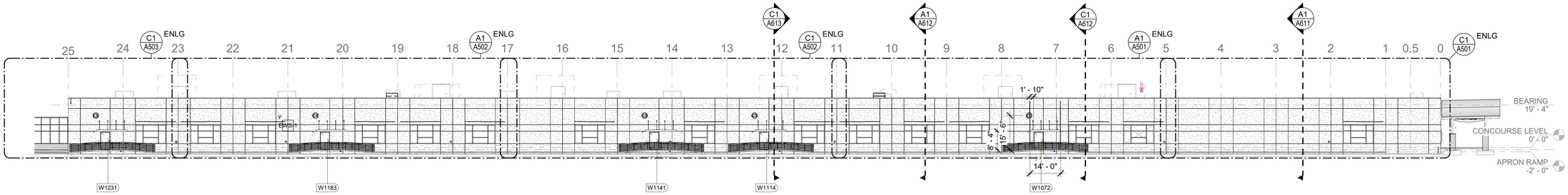
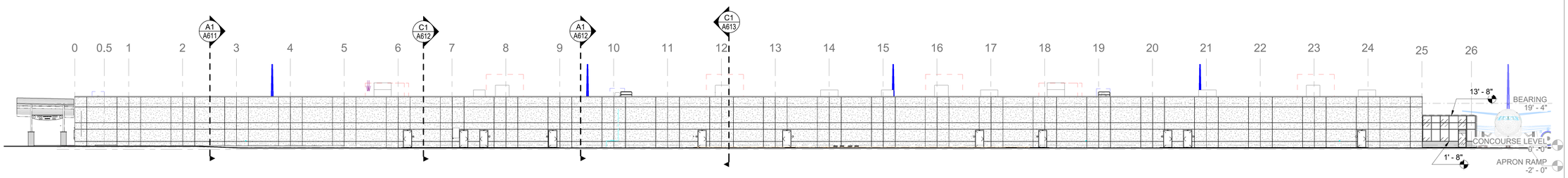


C1 EAST BUILDING ELEVATION (APRON VIEW)

1" = 20'-0"



B1 WEST BUILDING ELEVATION (SERVICE ROAD VIEW)

1" = 20'-0"

EXTERIOR FINISHES

GROUND FACE "BURNISHED" MASONRY SEE PLAN FOR THICKNESS

SMOOTH FINISH STUCCO SYSTEM W/PAINT SEE SPECIFICATIONS

OKALOOSA COUNTY

FLY VPS

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MLM JOB #: TYPE PROPERTY

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SEAL

Revisions

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Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	1" = 20'-0"

Drawing Title:

OVERALL KEY BUILDING ELEVATIONS

BID DOCUMENTS

Drawing No.:

A500

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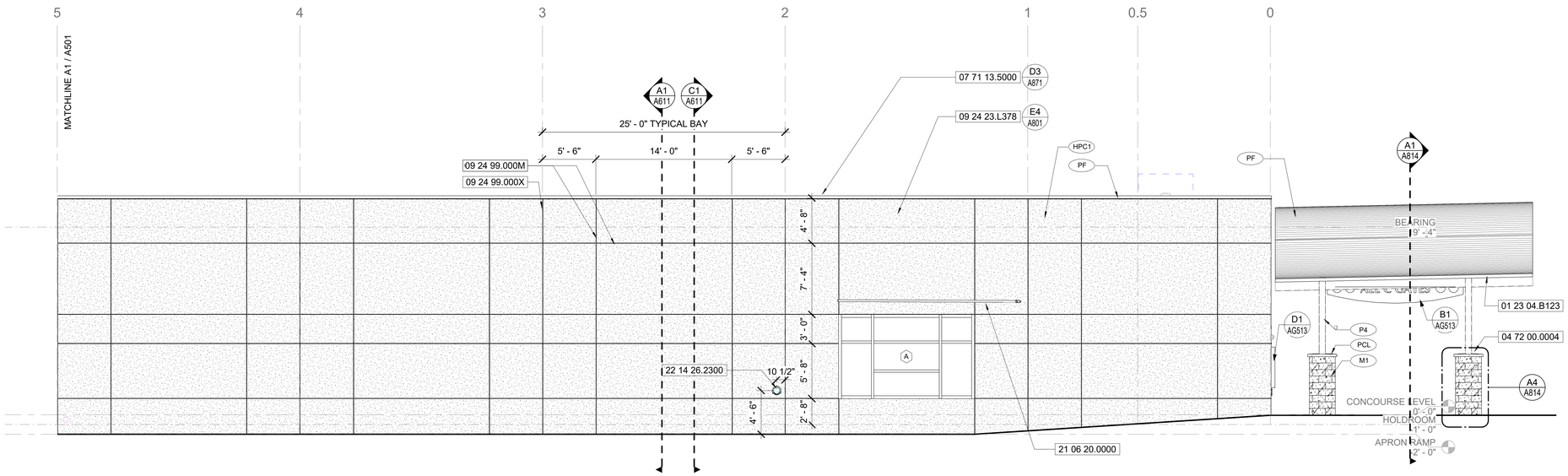
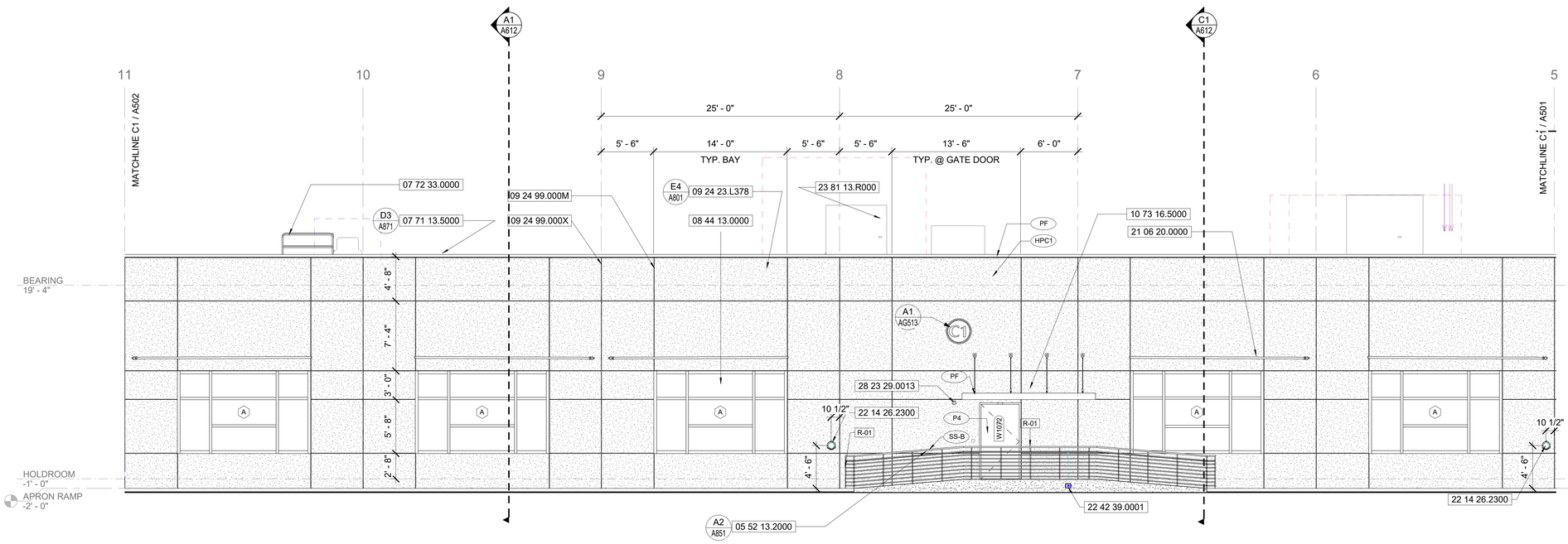


C1 EAST ENLARGED ELEVATION

3/16" = 1'-0"



A1 EAST ENLARGED ELEVATION

3/16" = 1'-0"

KEYNOTES

NO.	
01 23 04.B123	TYP. ALTERNATE 4 CANOPY CONTRUCTION WORK.
04 72 00.0004	TYP. CAST STONE CAP TO MATCH EXISTING, 4" TALL.
05 52 13.2000	TYP. STAINLESS STEEL PIPE AND TUBE RAILING.
07 71 13.5000	TYP. ALUMNINUM MANUFACTURED COPING SYSTEM, INSTALLED PER MNFR. INSTRUCTIONS.
07 72 33.0000	TYP. SINGLE-LEAF ROOF ACCESS HATCH W/ CURB AND SAFETY RAIL.
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
09 24 99.000M	TYP. CEMENT PLASTERING 'M' REVEAL SCREED ACESSORY.
09 24 99.000W	TYP. CEMENT PLASTERING WEEP SCREED ACESSORY.
09 24 99.000X	TYP. CEMENT PLASTERING EXPANSIN CHANNEL W/ 1/2" REVEAL SCREED ACESSORY.
10 73 16.5000	TYP. PREMANUFACTURED ALUMINUM CANOPY SYSTEM. PROVIDE SIGNED & SEALED CALCULATIONS/SHOPDRAWINGS COMPLYING W/ STRUCTURAL DESIGN LOADS.
21 06 20.0000	TYPICAL FIRE SUPPRESSION PIPING
22 14 26.2300	TYP. FACILITY STORM OVERFLOW OUTFALL FIXTURE, SEE PLUMBING. PROVIDE CONT. SEALANT AT WALL FLANGE.
22 42 39.0001	TYP. RECESSED EXTERIOR WALL HYDRANT, SEE PLUBMING.
23 81 13.R000	TYP. PACKAGED ROOFTOP UNIT, SEE MECH.
28 23 29.0013	TYP. VSS CAMERA, SEE SECURITY DRAWINGS

EXTERIOR FINISHES

GROUND FACE "BURNISHED" MASONRY SEE PLAN FOR THICKNESS

STUCCO FINISH SEE SHEET: A801

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction of Satellite Concourse 'C'

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ULM JOB # TYP. PROPERTY

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FL AR-98279

SEAL

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Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

BUILDING ELEVATIONS

BID DOCUMENTS

Drawing No.:

A501

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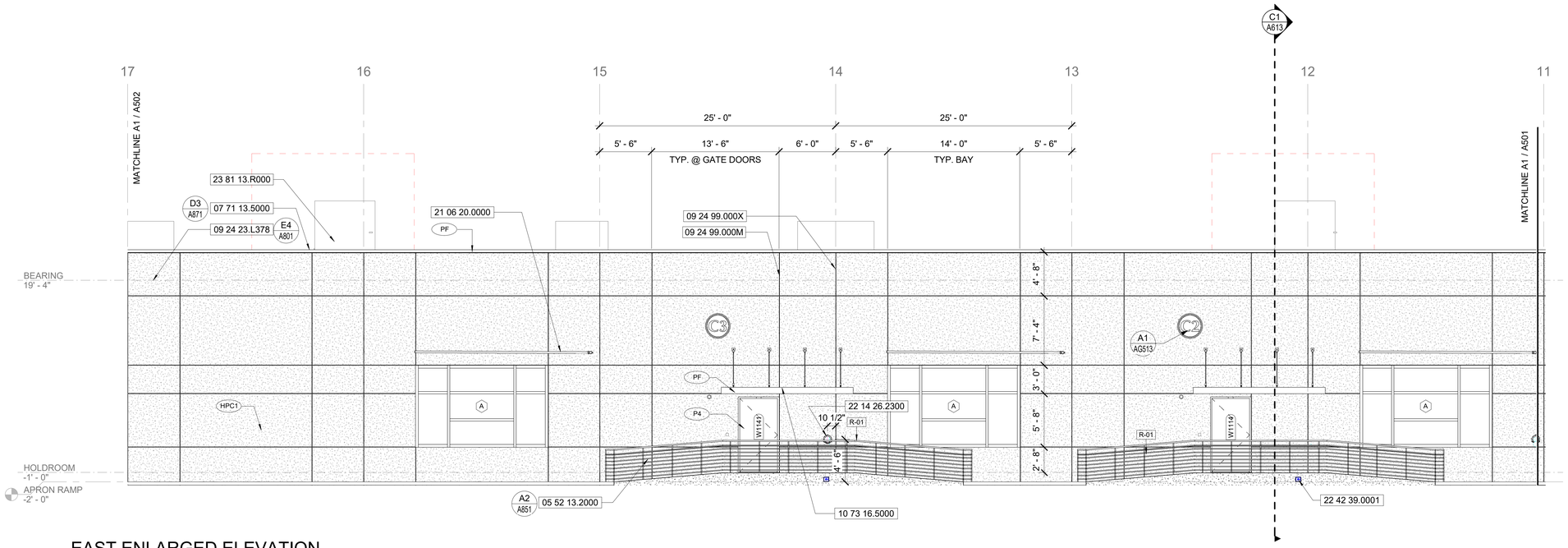
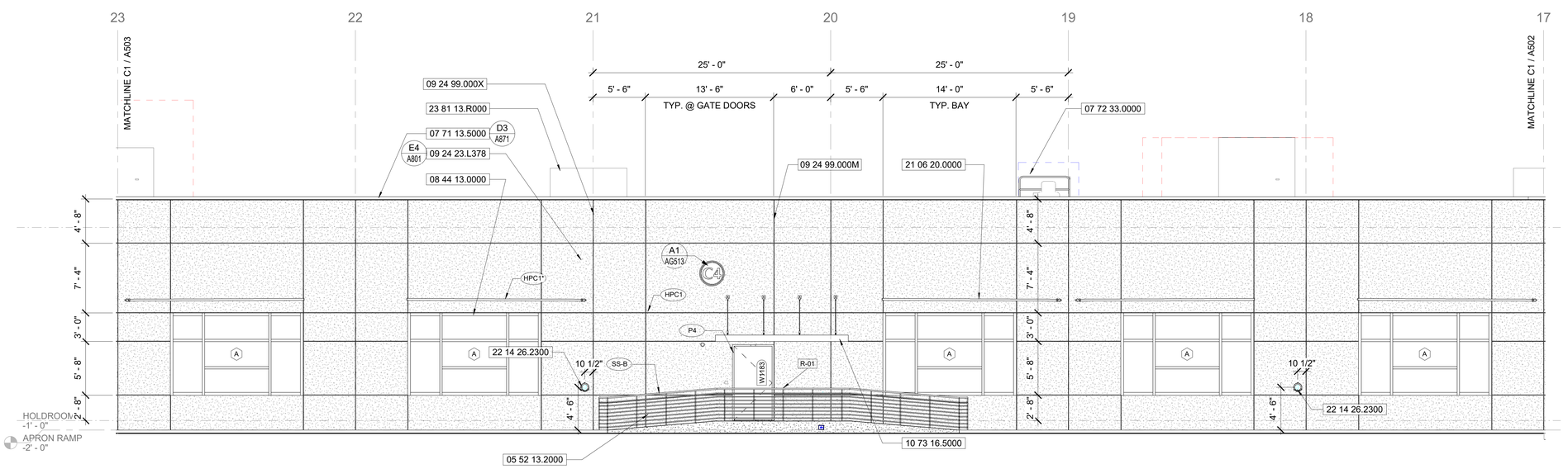


C1 EAST ENLARGED ELEVATION

3/16" = 1'-0"



A1 EAST ENLARGED ELEVATION

3/16" = 1'-0"

KEYNOTES

NO.	
05 52 13.2000	TYP. STAINLESS STEEL PIPE AND TUBE RAILING.
07 71 13.5000	TYP. ALUMNINUM MANUFACTURED COPING SYSTEM, INSTALLED PER MNFR. INSTRUCTIONS.
07 72 33.0000	TYP. SINGLE-LEAF ROOF ACCESS HATCH W/ CURB AND SAFETY RAIL.
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
09 24 99.000M	TYP. CEMENT PLASTERING 'M' REVEAL SCREED ACESSORY.
09 24 99.000X	TYP. CEMENT PLASTERING EXPANSIN CHANNEL W/ 1/2" REVEAL SCREED ACESSORY.
10 73 16.5000	TYP. PREMANUFACTURED ALUMINUM CANOPY SYSTEM. PROVIDE SIGNED & SEALED CALCULATIONS/SHOPDRAWINGS COMPLYING W/ STRUCTURAL DESIGN LOADS.
21 06 20.0000	TYPICAL FIRE SUPPRESSION PIPING
22 14 26.2300	TYP. FACILITY STORM OVERFLOW OUTFALL FIXTURE, SEE PLUMBING. PROVIDE CONT. SEALANT AT WALL FLANGE.
22 42 39.0001	TYP. RECESSED EXTERIOR WALL HYDRANT, SEE PLUBMING.
23 81 13.R000	TYP. PACKAGED ROOFTOP UNIT, SEE MECH.

EXTERIOR FINISHES

GROUND FACE "BURNISHED" MASONRY SEE PLAN FOR THICKNESS

STUCCO FINISH SEE SHEET: A801

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

OKALOOSA COUNTY

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Drawing Title:

BUILDING ELEVATIONS

BID DOCUMENTS

Drawing No.:

A502

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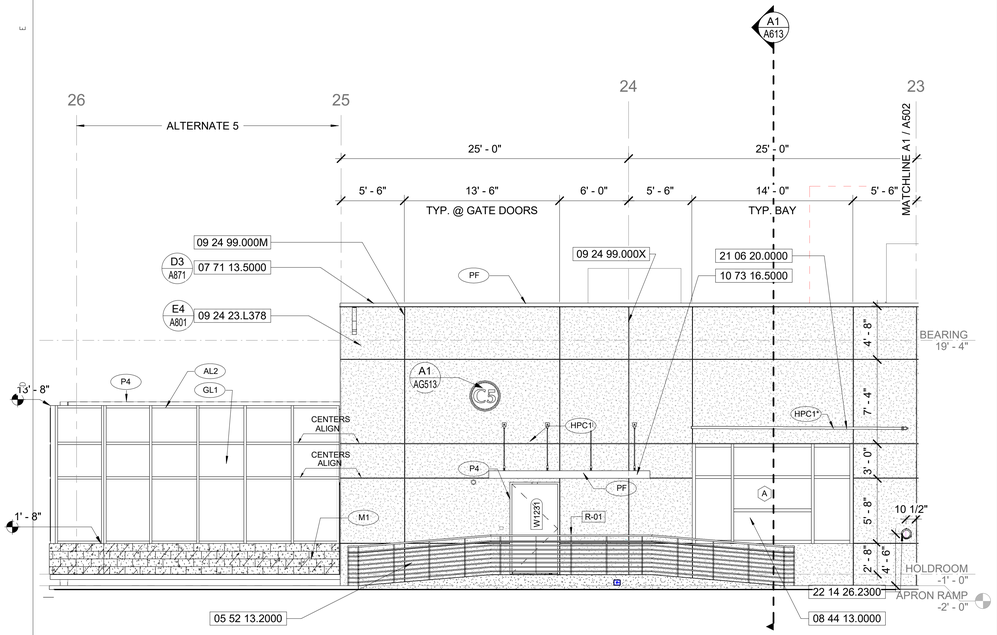
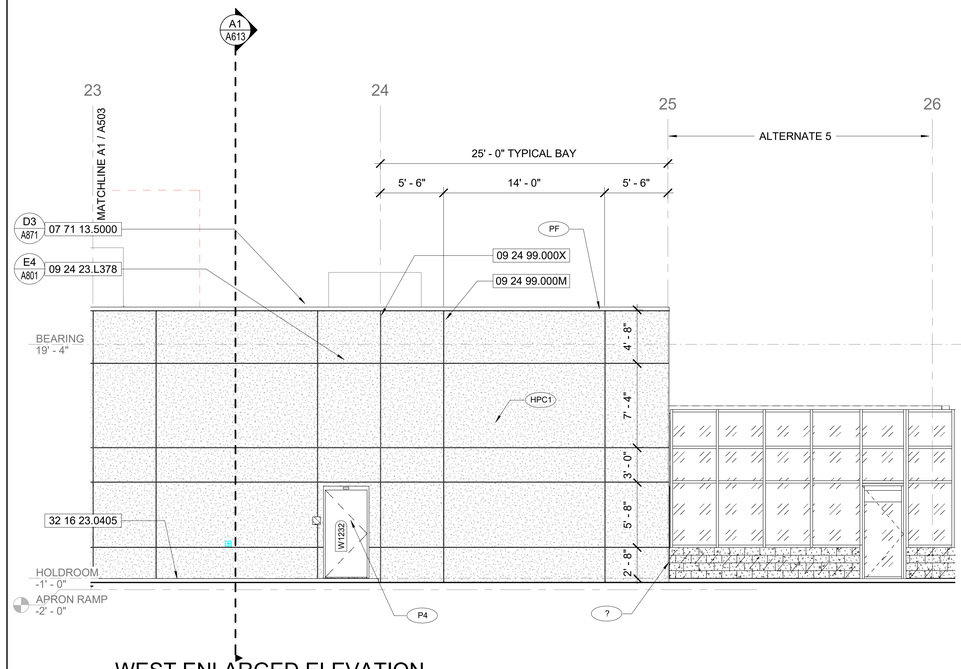


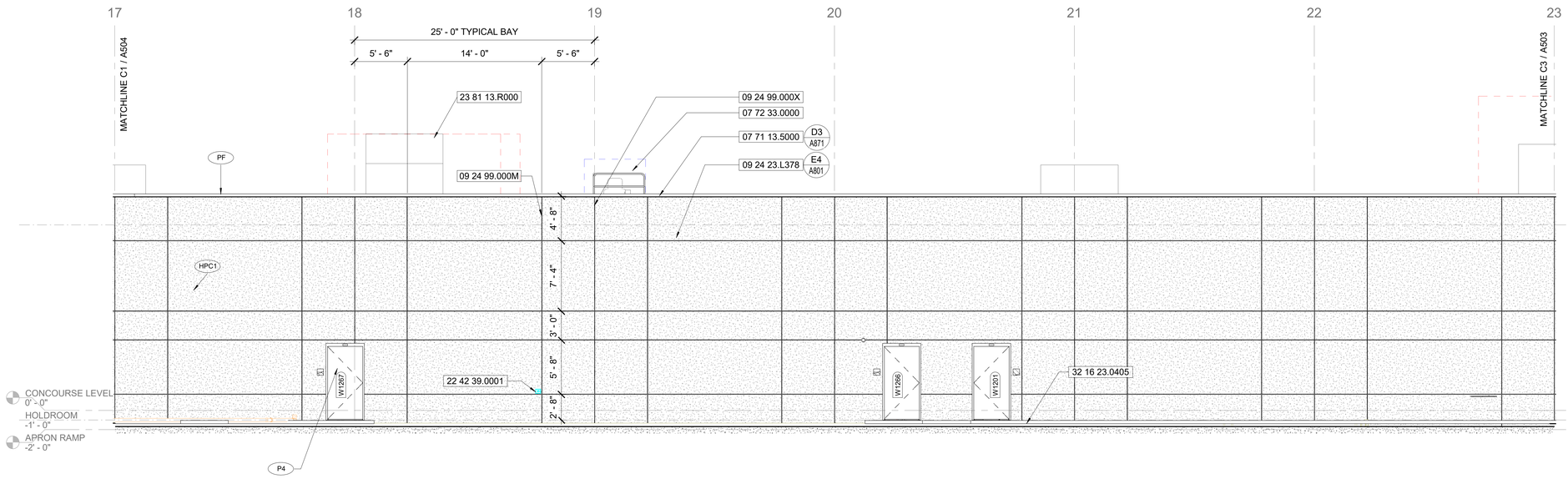
C1 EAST ENLARGED ELEVATION

3/16" = 1'-0"



C3 WEST ENLARGED ELEVATION

3/16" = 1'-0"



A1 WEST ENLARGED ELEVATION

3/16" = 1'-0"

KEYNOTES

NO.	
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07 72 33.0000	TYP. SINGLE-LEAF ROOF ACCESS HATCH W/ CURB AND SAFETY RAIL.
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
09 24 99.000M	TYP. CEMENT PLASTERING 'M' REVEAL SCREED ACESSORY.
09 24 99.000X	TYP. CEMENT PLASTERING EXPANSIN CHANNEL W/ 1/2" REVEAL SCREED ACESSORY.
10 73 16.5000	TYP. PREMANUFACTURED ALUMINUM CANOPY SYSTEM. PROVIDE SIGNED & SEALED CALCULATIONS/SHOPDRAWINGS COMPLYING W/ STRUCTURAL DESIGN LOADS.
21 06 20.0000	TYPICAL FIRE SUPPRESSION PIPING
22 14 26.2300	TYP. FACILITY STORM OVERFLOW OUTFALL FIXTURE, SEE PLUMBING. PROVIDE CONT. SEALANT AT WALL FLANGE.
22 42 39.0001	TYP. RECESSED EXTERIOR WALL HYDRANT, SEE PLUBMING.
23 81 13.R000	TYP. PACKAGED ROOFTOP UNIT, SEE MECH.
32 16 23.0405	TYP. 4" BROOM FINISHED CONCRETE SIDEWALK.

EXTERIOR FINISHES

GROUND FACE "BURNISHED" MASONRY SEE PLAN FOR THICKNESS

STUCCO FINISH SEE SHEET: A801

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

C19-2811- AP
Construction of Satellite Concourse 'C'

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MIGUEL ANTONIO MARTIN
FL AR-98279

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Drawn By:	ST, CC, DM, CB
Checked By:	MAM
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Drawing Scale:	3/16" = 1'-0"

Drawing Title:

BUILDING ELEVATIONS

BID DOCUMENTS

Drawing No.:

A503

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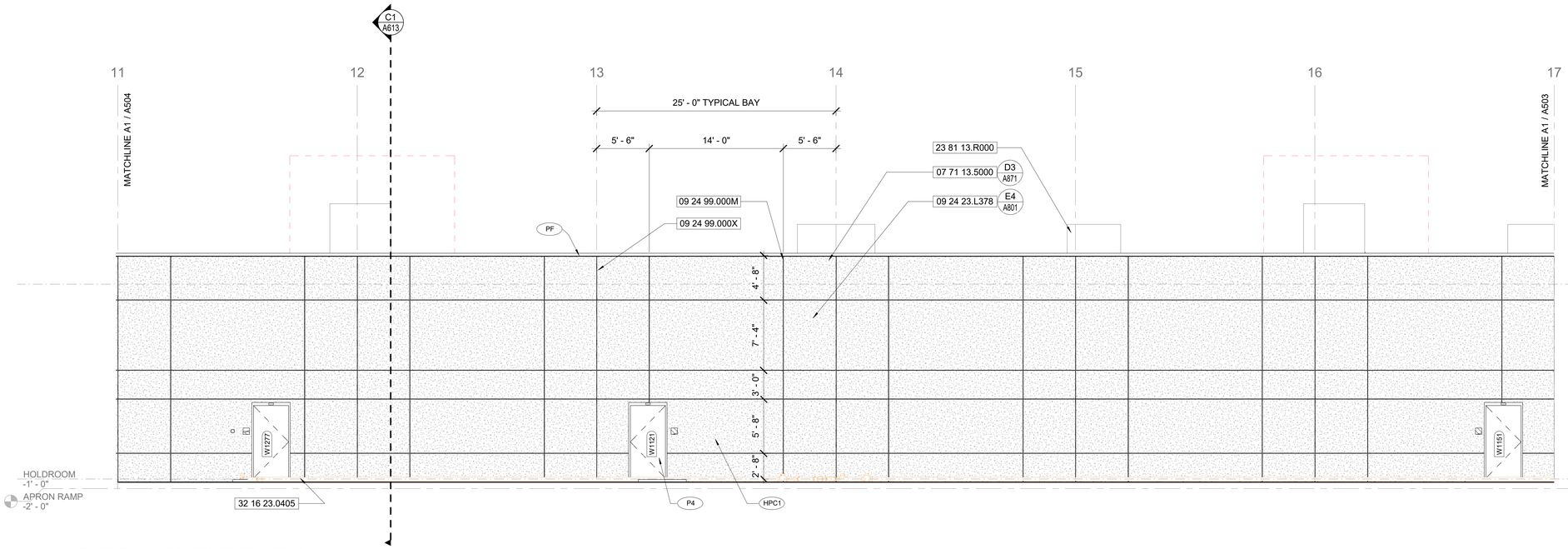
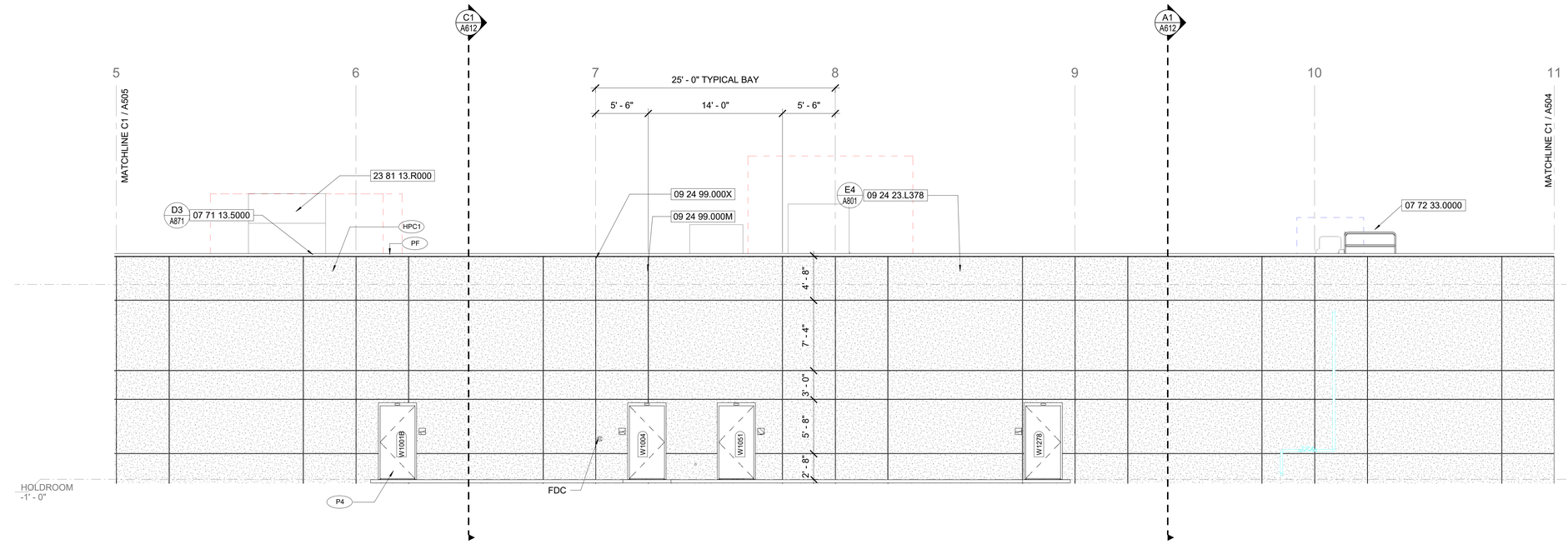


C1 WEST ENLARGED ELEVATION

3/16" = 1'-0"



A1 WEST ENLARGED ELEVATION

3/16" = 1'-0"

KEYNOTES

NO.	
07 71 13.5000	TYP. ALUMINUM MANUFACTURED COPING SYSTEM, INSTALLED PER MNFR. INSTRUCTIONS.
07 72 33.0000	TYP. SINGLE-LEAF ROOF ACCESS HATCH W/ CURB AND SAFETY RAIL.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
09 24 99.000M	TYP. CEMENT PLASTERING 'M' REVEAL SCREED ACESSORY.
09 24 99.000X	TYP. CEMENT PLASTERING EXPANSIN CHANNEL W/ 1/2" REVEAL SCREED ACESSORY.
23 81 13.R000	TYP. PACKAGED ROOFTOP UNIT, SEE MECH.
32 16 23.0405	TYP. 4" BROOM FINISHED CONCRETE SIDEWALK.

EXTERIOR FINISHES

GROUND FACE "BURNISHED" MASONRY SEE PLAN FOR THICKNESS

STUCCO FINISH SEE SHEET: A801

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

C19-2811- AP Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
SUITE 107
MAITLAND, FL 32751
407.897.6764 (VOICE)
407.894.1338 (FAX)
WWW.MLM-MARTIN.COM
AA-C002208
OLM 308 & 7 TYP. PROPERTY
MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

BUILDING ELEVATIONS

BID DOCUMENTS

Drawing No.:

A504

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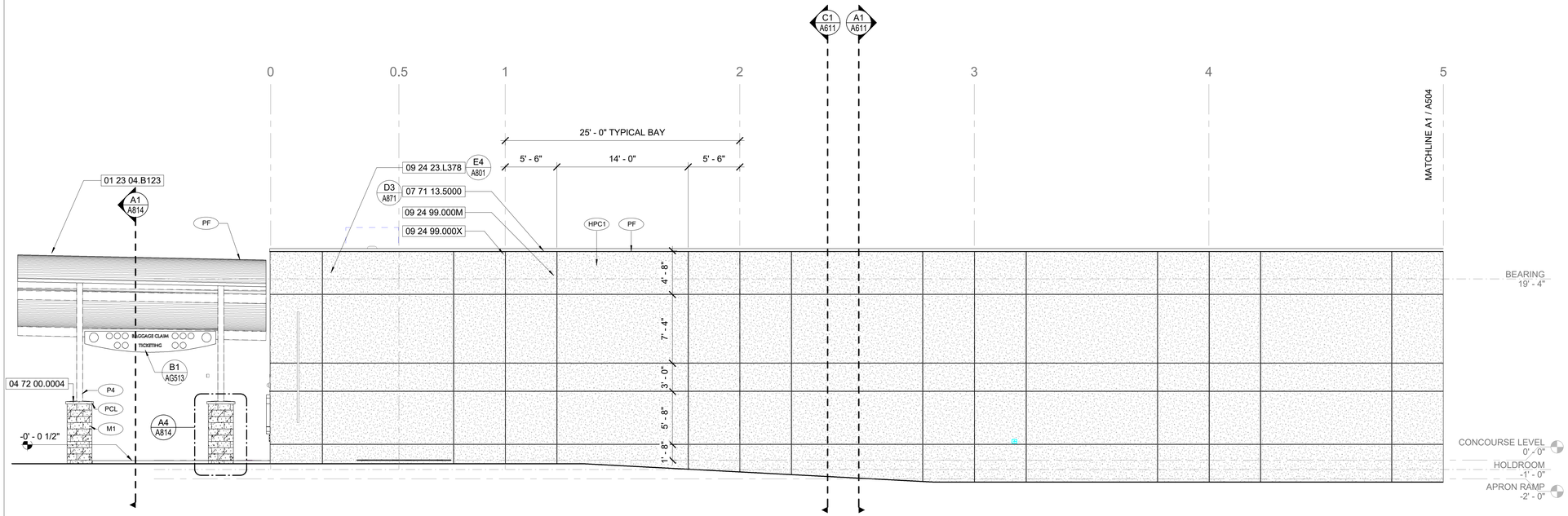
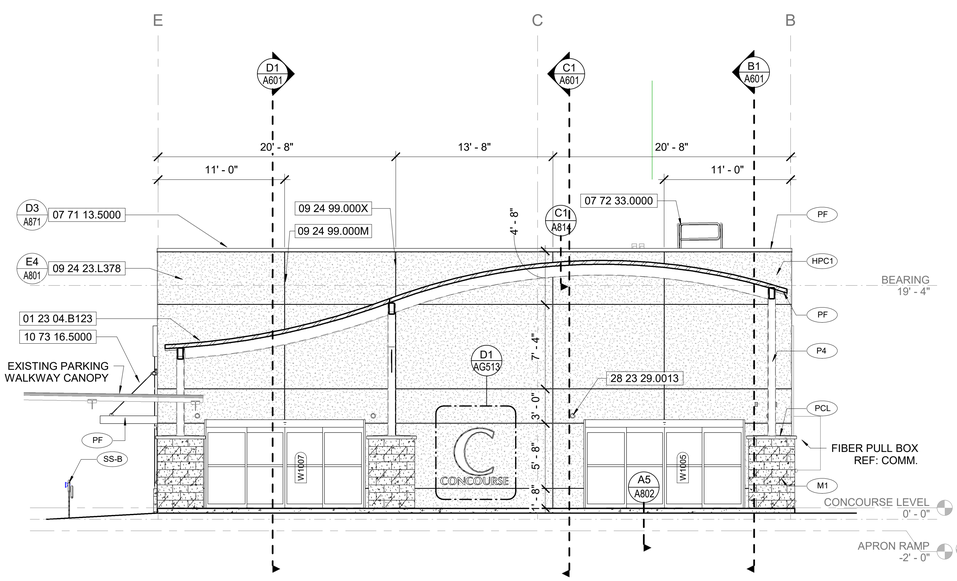


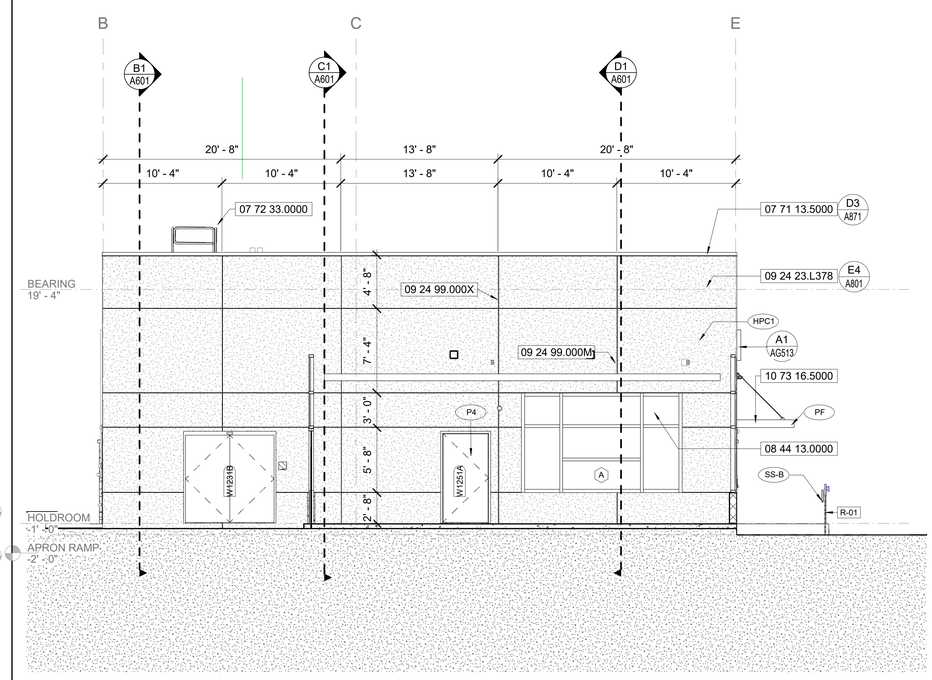
C1 WEST ENLARGED ELEVATION

3/16" = 1'-0"



A1 NORTH BUILDING ELEVATION

3/16" = 1'-0"



A3 SOUTH BUILDING ELEVATION

3/16" = 1'-0"

KEYNOTES

NO.	
01 23 04.B123	TYP. ALTERNATE 4 CANOPY CONTRUCTION WORK.
04 72 00.0004	TYP. CAST STONE CAP TO MATCH EXISTING, 4" TALL.
07 71 13.5000	TYP. ALUMNINUM MANUFACTURED COPING SYSTEM, INSTALLED PER MNFR. INSTRUCTIONS.
07 72 33.0000	TYP. SINGLE-LEAF ROOF ACCESS HATCH W/ CURB AND SAFETY RAIL.
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
09 24 99.000M	TYP. CEMENT PLASTERING 'M' REVEAL SCREED ACESSORY.
09 24 99.000X	TYP. CEMENT PLASTERING EXPANSIN CHANNEL W/ 1/2" REVEAL SCREED ACESSORY.
10 73 16.5000	TYP. PREMANUFACTURED ALUMINUM CANOPY SYSTEM. PROVIDE SIGNED & SEALED CALCULATIONS/SHOPDRAWINGS COMPLYING W/ STRUCTURAL DESIGN LOADS.
28 23 29.0013	TYP. VSS CAMERA, SEE SECURITY DRAWINGS

EXTERIOR FINISHES

GROUND FACE "BURNISHED" MASONRY SEE PLAN FOR THICKNESS

STUCCO FINISH SEE SHEET: A801

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

C19-2811- AP Construction of Satellite Concourse 'C'

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AA-C002208
OLM JOB # TYP. PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

BUILDING ELEVATIONS

BID DOCUMENTS

Drawing No.:

A505

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt
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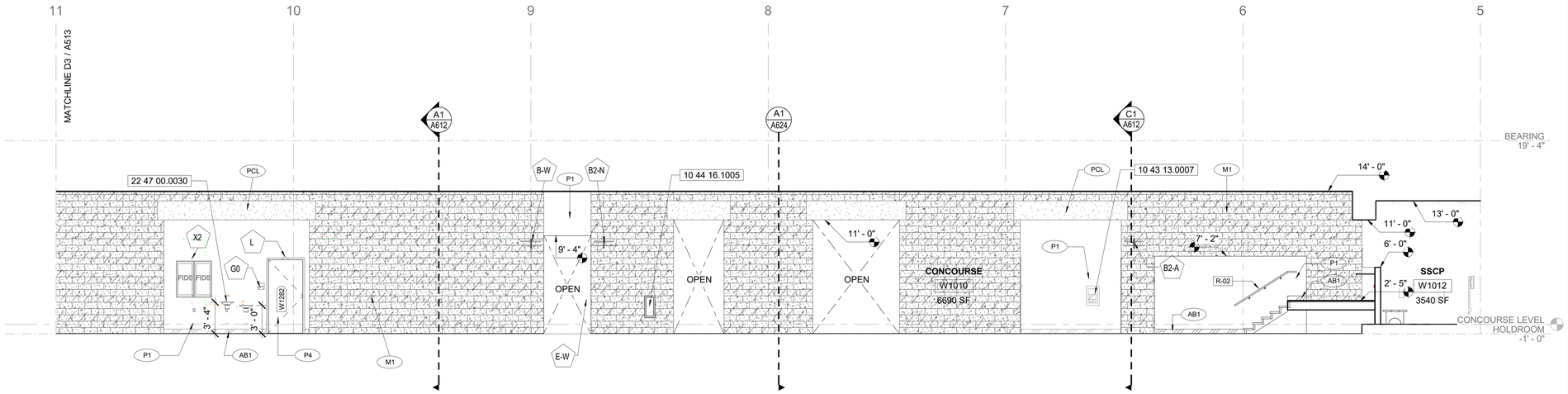
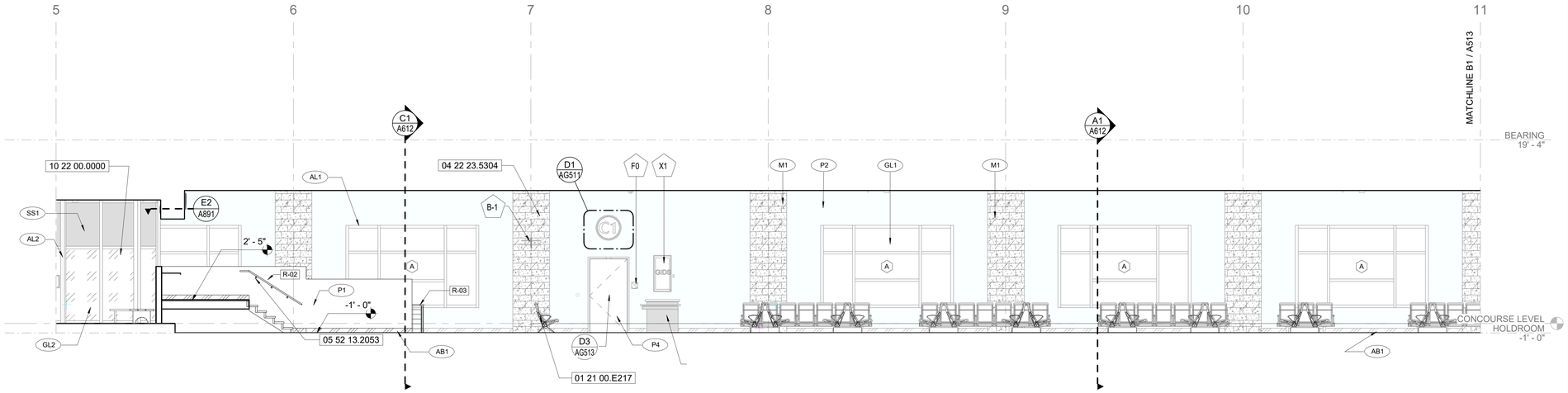


D1 INTERIOR CONCOURSE ELEVATION

3/16" = 1'-0"



B1 INTERIOR CONCOURSE ELEVATION

3/16" = 1'-0"

KEYNOTES

NO.	
01 21 00.E217	TYP. ALLOWANCE FOR FIXED MULTIPLE SEATING WORK.
04 22 23.5304	TYP. 4" BURNISHED CONCRETE MASONRY UNIT
05 52 13.2053	TYP. STAINLESS STEEL PIPE AND TUBE RAILING, HANDRAIL RAIL SUPPORTS AS REQ'D.
10 22 00.0000	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY.
10 43 13.0007	TYP. WALL CABINENT MOUNTED AUTOMATIC ELECTRONIC DEFIBRILLATOR (AED).
10 44 16.1005	TYP. RECESSED WALL CABINENT MOUNTED MULTI-PURPOSE (ABC CLASS) FIRE EXTINGUISHER.
22 47 00.0030	DRINKING FOUNTAIN SEE PLUMBING

NOTES

1. REFER TO **A** SERIES SHEETS FOR PARTITION MARKERS AND **AL641** FOR PARTITION TYPES
2. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE. 1t
3. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET **A711** 101
4. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
5. ELEVATION MARKERS ARE ESTABLISHED AT CONCOURSE = 0' - 0"
6. RAILING CONSTRUCTION AND TYPES REFER TO SHEET **A865** 1t
7. AREA DESIGNATED FOR FUTURE WORK (NIC). CONTRACTOR SHALL KEEP THIS AREA CLEAR OF ANY BUILT ELEMENTS ABOVE AND/OR BELOW GROUND UNLESS OTHERWISE NOTED WITHIN THE SCOPE OF THIS PROJECT.
8. CONCESSION AREAS SHALL BE FIT OUT AS SHELL SPACES WITH CODE MINIMUM SYSTEMS SUPPORT AS INDICATED.

FINISH LEGEND

? MATERIAL CODE SYMBOL: SEE **AF712** FOR DEFINITIONS

- CT2
- P1
- P2
- P3
- P4
- HPC2-SAFETY YELLOW ?
- PCL
- M1
- AB1

NOT ALL FINISHES ARE GRAPHICALLY KEYED IN THIS LEGEND. REFER TO **AF712** FOR MORE INFORMATION.

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

OKALOOSA COUNTY

FLY VPS

C19-2811- AP Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
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WWW.MLM-MARTIN.COM
AA-C002208
MLM JOB #: TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

INTERIOR ELEVATIONS

BID DOCUMENTS

Drawing No.:

A512

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

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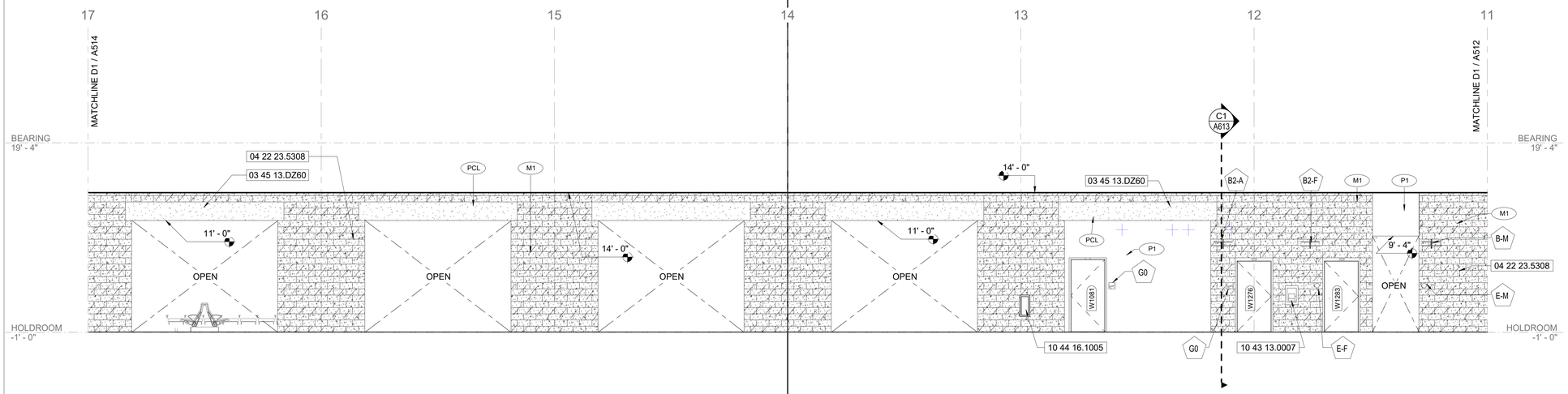
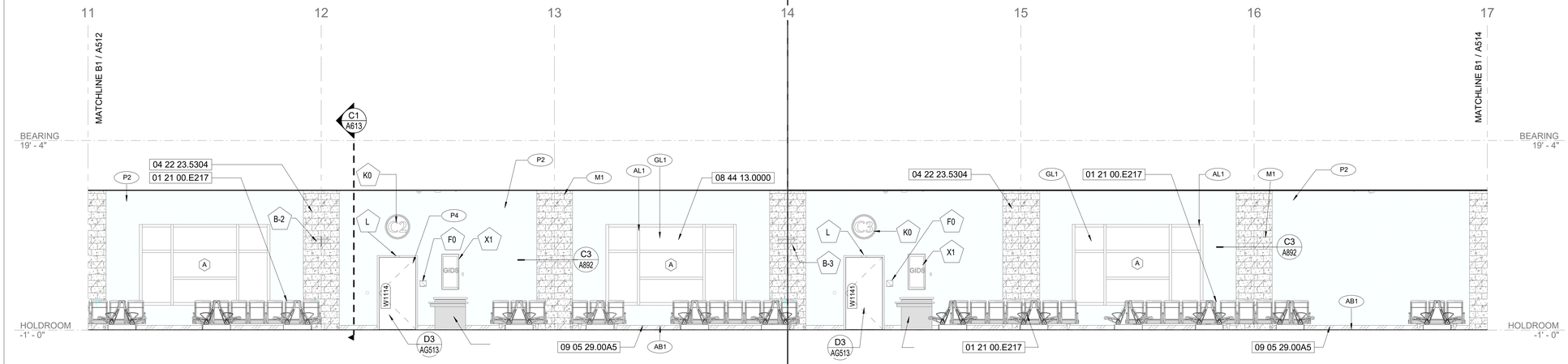


D1 INTERIOR CONCOURSE ELEVATION

3/16" = 1'-0"



B1 INTERIOR CONCOURSE ELEVATION

3/16" = 1'-0"

B3 INTERIOR CONCOURSE ELEVATION

3/16" = 1'-0"

KEYNOTES

NO.	
01 21 00.E217	TYP. ALLOWANCE FOR FIXED MULTIPLE SEATING WORK.
03 45 13.DZ60	TYP. 8" X 24" FACED ARCHITECTURAL PRECAST CONCRETE, SAND FINISH.
04 22 23.5304	TYP. 4" BURNISHED CONCRETE MASONRY UNIT
04 22 23.5308	TYP. 8" BURNISHED CONCRETE MASONRY UNIT
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
09 05 29.00A5	TYP. ALUMINUM GYPSUM BOARD REVEAL BASE ACCESSORY.
10 43 13.0007	TYP. WALL CABINENT MOUNTED AUTOMATIC ELECTRONIC DEFIBRILLATOR (AED).
10 44 16.1005	TYP. RECESSED WALL CABINENT MOUNTED MULTI-PURPOSE (ABC CLASS) FIRE EXTINGUISHER.

NOTES

1. REFER TO **A** SERIES SHEETS FOR PARTITION MARKERS AND **AL641** FOR PARTITION TYPES
2. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE. (1t)
3. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET **A711** (101)
4. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
5. ELEVATION MARKERS ARE ESTABLISHED AT CONCOURSE = 0' - 0"
6. RAILING CONSTRUCTION AND TYPES REFER TO SHEET **A865** (1t)
7. AREA DESIGNATED FOR FUTURE WORK (NIC). CONTRACTOR SHALL KEEP THIS AREA CLEAR OF ANY BUILT ELEMENTS ABOVE AND/OR BELOW GROUND UNLESS OTHERWISE NOTED WITHIN THE SCOPE OF THIS PROJECT.
8. CONCESSION AREAS SHALL BE FIT OUT AS SHELL SPACES WITH CODE MINMUM SYSTEMS SUPPORT AS INDICATED.

FINISH LEGEND

(?) MATERIAL CODE SYMBOL: SEE **AF712** FOR DEFINITIONS

- CT2
- P1
- P2
- P3
- P4
- HPC2-SAFETY YELLOW
- PCL
- M1
- AB1

NOT ALL FINISHES ARE GRAPHICALLY KEYED IN THIS LEGEND. REFER TO **AF712** FOR MORE INFORMATION.

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
SUITE 107
MAITLAND, FL 32751
407.897.6764 (VOICE)
407.894.1338 (FAX)
WWW.MLM-MARTIN.COM
AA-C002208
MLM JOB #: TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

INTERIOR ELEVATIONS

BID DOCUMENTS

Drawing No.:

A513

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

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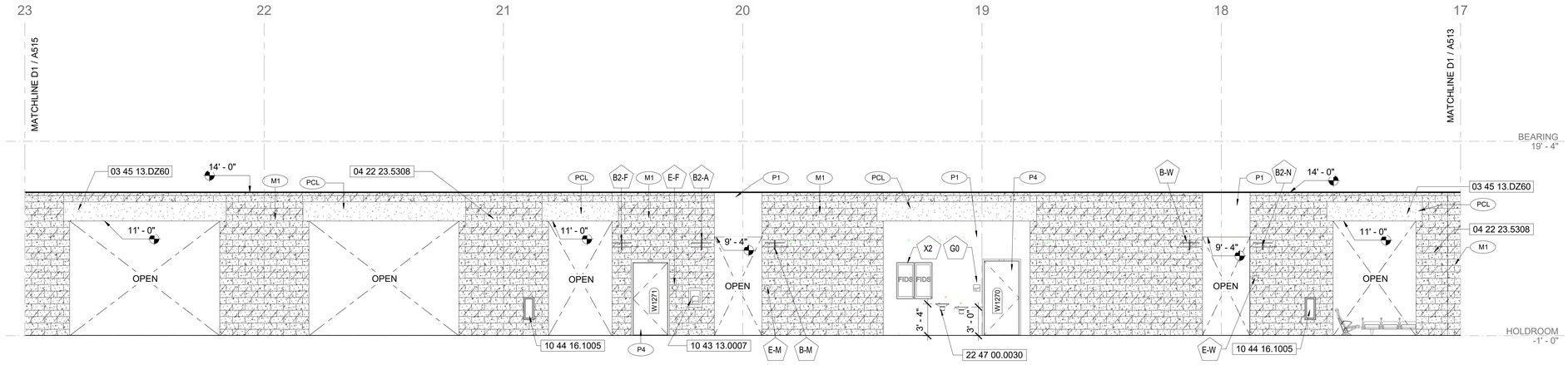
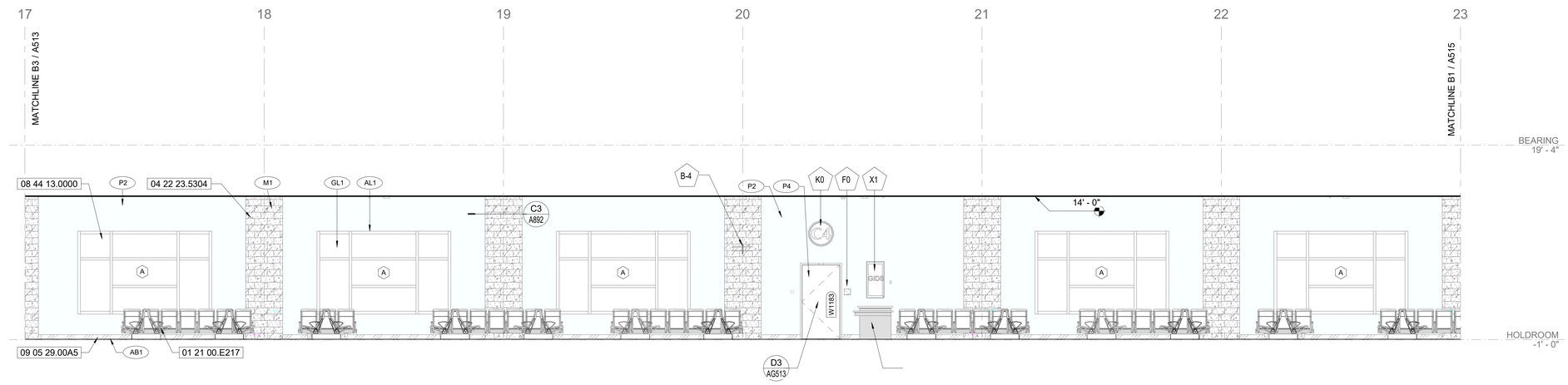


D1 INTERIOR CONCOURSE ELEVATION

3/16" = 1'-0"



B1 INTERIOR CONCOURSE ELEVATION

3/16" = 1'-0"

KEYNOTES

NO.	
01 21 00.E217	TYP. ALLOWANCE FOR FIXED MULTIPLE SEATING WORK.
03 45 13.DZ60	TYP. 8" X 24" FACED ARCHITECTURAL PRECAST CONCRETE, SAND FINISH.
04 22 23.5304	TYP. 4" BURNISHED CONCRETE MASONRY UNIT
04 22 23.5308	TYP. 8" BURNISHED CONCRETE MASONRY UNIT
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
09 05 29.00A5	TYP. ALUMINUM GYPSUM BOARD REVEAL BASE ACCESSORY.
10 43 13.0007	TYP. WALL CABINENT MOUNTED AUTOMATIC ELECTRONIC DEFIBRILLATOR (AED).
10 44 16.1005	TYP. RECESSED WALL CABINENT MOUNTED MULTI-PURPOSE (ABC CLASS) FIRE EXTINGUISHER.
22 47 00.0030	DRINKING FOUNTAIN SEE PLUMBING

NOTES

1. REFER TO **A** SERIES SHEETS FOR PARTITION MARKERS AND **AL641** FOR PARTITION TYPES
2. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE. 1t
3. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET **A711** 101
4. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
5. ELEVATION MARKERS ARE ESTABLISHED AT CONCOURSE = 0' - 0"
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7. AREA DESIGNATED FOR FUTURE WORK (NIC). CONTRACTOR SHALL KEEP THIS AREA CLEAR OF ANY BUILT ELEMENTS ABOVE AND/OR BELOW GROUND UNLESS OTHERWISE NOTED WITHIN THE SCOPE OF THIS PROJECT.
8. CONCESSION AREAS SHALL BE FIT OUT AS SHELL SPACES WITH CODE MINIMUM SYSTEMS SUPPORT AS INDICATED.

FINISH LEGEND

? MATERIAL CODE SYMBOL: SEE **AF712** FOR DEFINITIONS

- CT2
- P1
- P2
- P3
- P4
- HPC2-SAFETY YELLOW
- PCL
- M1
- AB1

NOT ALL FINISHES ARE GRAPHICALLY KEYED IN THIS LEGEND. REFER TO **AF712** FOR MORE INFORMATION.

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

OKALOOSA COUNTY

FLY VPS

C19-2811- AP Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
SUITE 107
MAITLAND, FL 32751
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WWW.MLM-MARTIN.COM
AA-C002208
MLM JOB #: TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

INTERIOR ELEVATIONS

BID DOCUMENTS

Drawing No.:

A514

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

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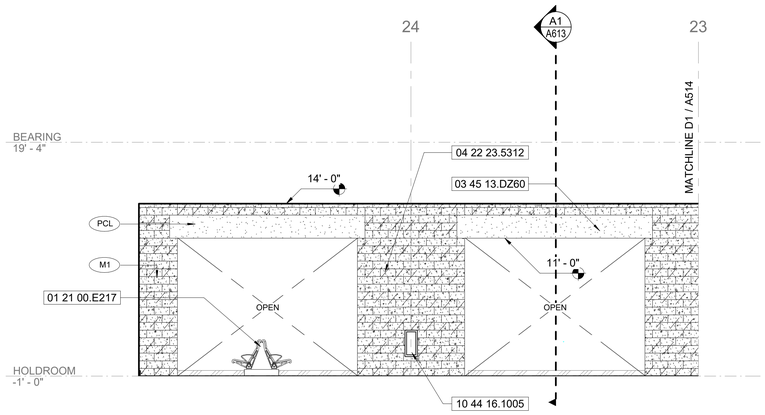
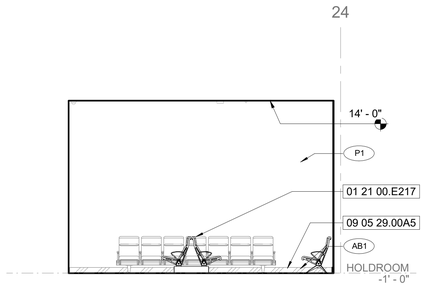


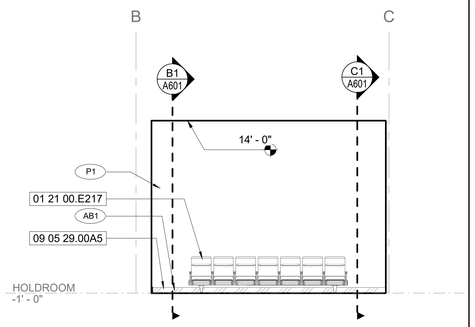
D1 INTERIOR CONCOURSE ELEVATION

3/16" = 1'-0"



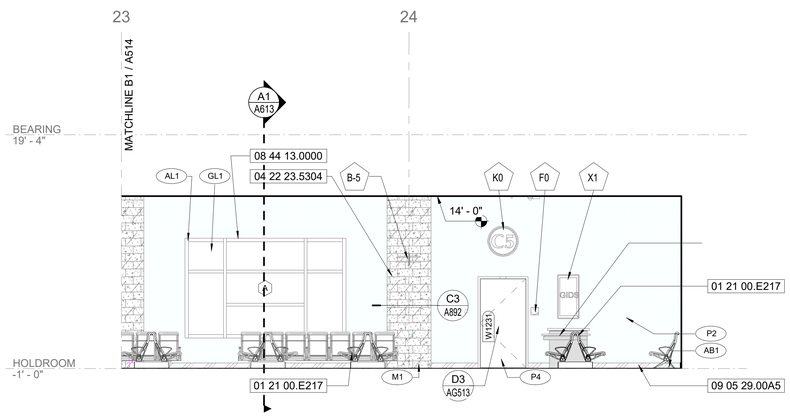
D3 INTERIOR CONCOURSE ELEVATION

3/16" = 1'-0"



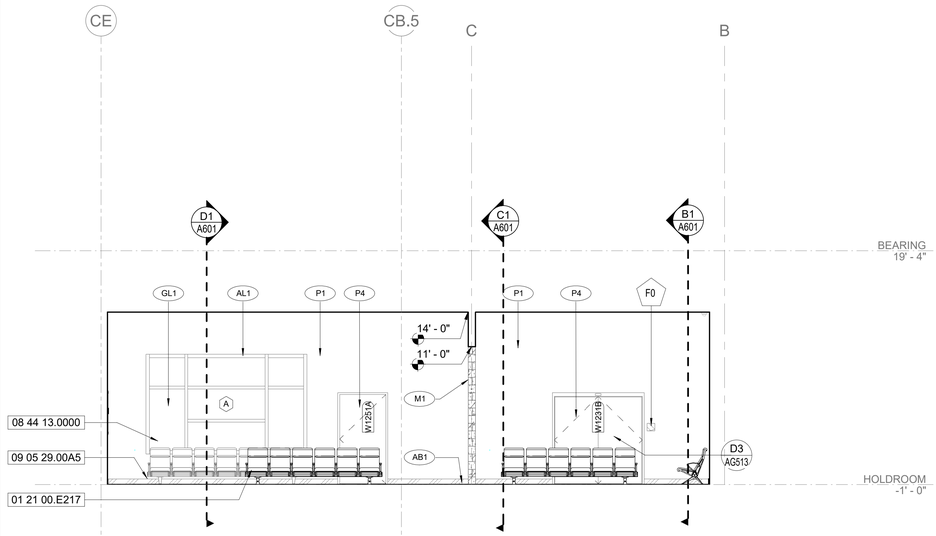
D5 INTERIOR CONCOURSE ELEVATION

3/16" = 1'-0"



B1 INTERIOR CONCOURSE ELEVATION

3/16" = 1'-0"



B3 INTERIOR CONCOURSE ELEVATION

3/16" = 1'-0"

KEYNOTES

NO.	
01 21 00.E217	TYP. ALLOWANCE FOR FIXED MULTIPLE SEATING WORK.
03 45 13.DZ60	TYP. 8" X 24" FACED ARCHITECTURAL PRECAST CONCRETE, SAND FINISH.
04 22 23.5304	TYP. 4" BURNISHED CONCRETE MASONRY UNIT
04 22 23.5312	TYP. 12" BURNISHED CONCRETE MASONRY UNIT
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
09 05 29.00A5	TYP. ALUMINUM GYPSUM BOARD REVEAL BASE ACCESSORY.
10 44 16.1005	TYP. RECESSED WALL CABINENT MOUNTED MULTI-PURPOSE (ABC CLASS) FIRE EXTINGUISHER.

NOTES

1. REFER TO **A** SERIES SHEETS FOR PARTITION MARKERS AND **AL641** FOR PARTITION TYPES
2. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE. (1t)
3. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET **A711** (101)
4. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
5. ELEVATION MARKERS ARE ESTABLISHED AT CONCOURSE = 0' - 0"
6. RAILING CONSTRUCTION AND TYPES REFER TO SHEET **A865** (1t)
7. AREA DESIGNATED FOR FUTURE WORK (NIC). CONTRACTOR SHALL KEEP THIS AREA CLEAR OF ANY BUILT ELEMENTS ABOVE AND/OR BELOW GROUND UNLESS OTHERWISE NOTED WITHIN THE SCOPE OF THIS PROJECT.
8. CONCESSION AREAS SHALL BE FIT OUT AS SHELL SPACES WITH CODE MINIMUM SYSTEMS SUPPORT AS INDICATED.

FINISH LEGEND

(?) MATERIAL CODE SYMBOL: SEE **AF712** FOR DEFINITIONS

- CT2
- P1
- P2
- P3
- P4
- HPC2-SAFETY YELLOW
- PCL
- M1
- AB1

NOT ALL FINISHES ARE GRAPHICALLY KEYED IN THIS LEGEND. REFER TO **AF712** FOR MORE INFORMATION.

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

C19-2811- AP
Construction of Satellite Concourse 'C'

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AA-C002208
ULM 308 F.S. TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	**MLM-19672**
Designed By:	**MLM, MAM**
Drawn By:	**ST, CC, DM, CB**
Checked By:	**MAM**
Issue Date:	**30-NOV-2020**
Drawing Scale:	**3/16" = 1'-0"**

Drawing Title:

INTERIOR ELEVATIONS

BID DOCUMENTS

Drawing No.:

A515

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

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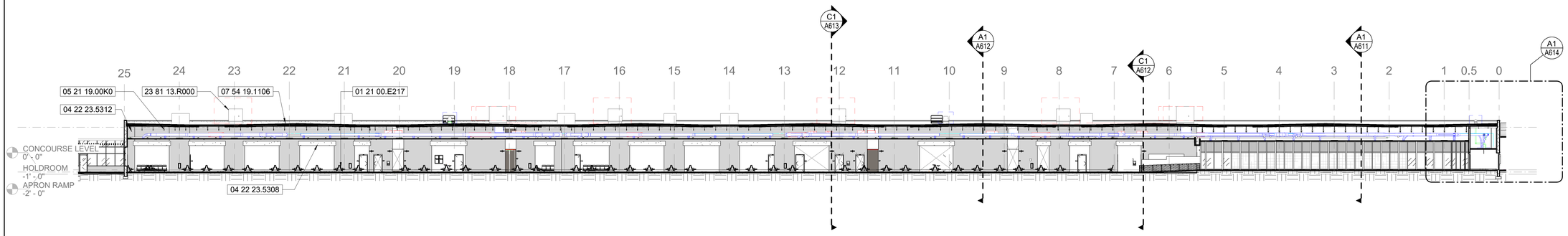
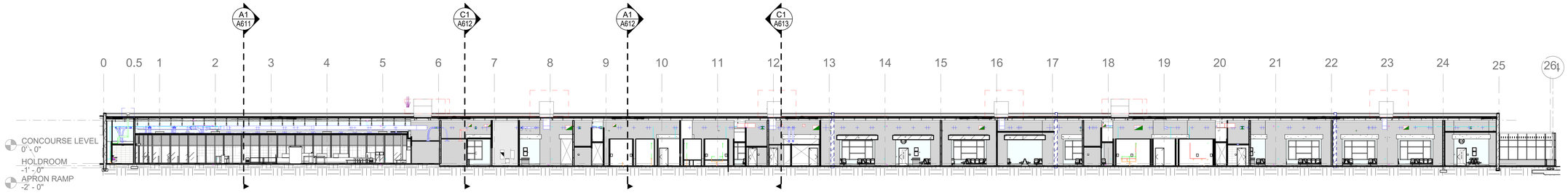
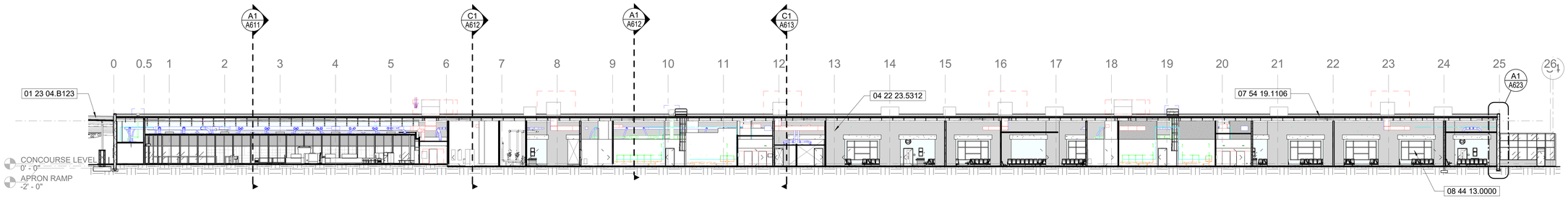


D1 BUILDING SECTION
1" = 20'-0"



C1 BUILDING SECTION
1" = 20'-0"



B1 BUILDING SECTION
1" = 20'-0"

KEYNOTES

NO.	
01 21 00.E217	TYP. ALLOWANCE FOR FIXED MULTIPLE SEATING WORK.
01 23 04.B123	TYP. ALTERNATE 4 CANOPY CONTRUCTION WORK.
04 22 23.5308	TYP. 8" BURNISHED CONCRETE MASONRY UNIT
04 22 23.5312	TYP. 12" BURNISHED CONCRETE MASONRY UNIT

KEYNOTES

NO.	
05 21 19.00K0	TYP. K SERIES OPEN WEB STEEL JOIST, SEE STRUCTURAL.
07 54 19.1106	TYP. COLD ADHESIVE APPLIED, 60 MIL PVC MEMBRAINE ROOFING.
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
23 81 13.R000	TYP. PACKAGED ROOFTOP UNIT, SEE MECH.

SCALE: 1" = 20'-0"
0 5' 10' 20' 40'

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
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WWW.MLM-MARTIN.COM
AA-C002208
MLM JOB #: TYPE PROPERTY
MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	1" = 20'-0"

Drawing Title:
OVERALL BUILDING SECTIONS
BID DOCUMENTS

Drawing No.:
A601

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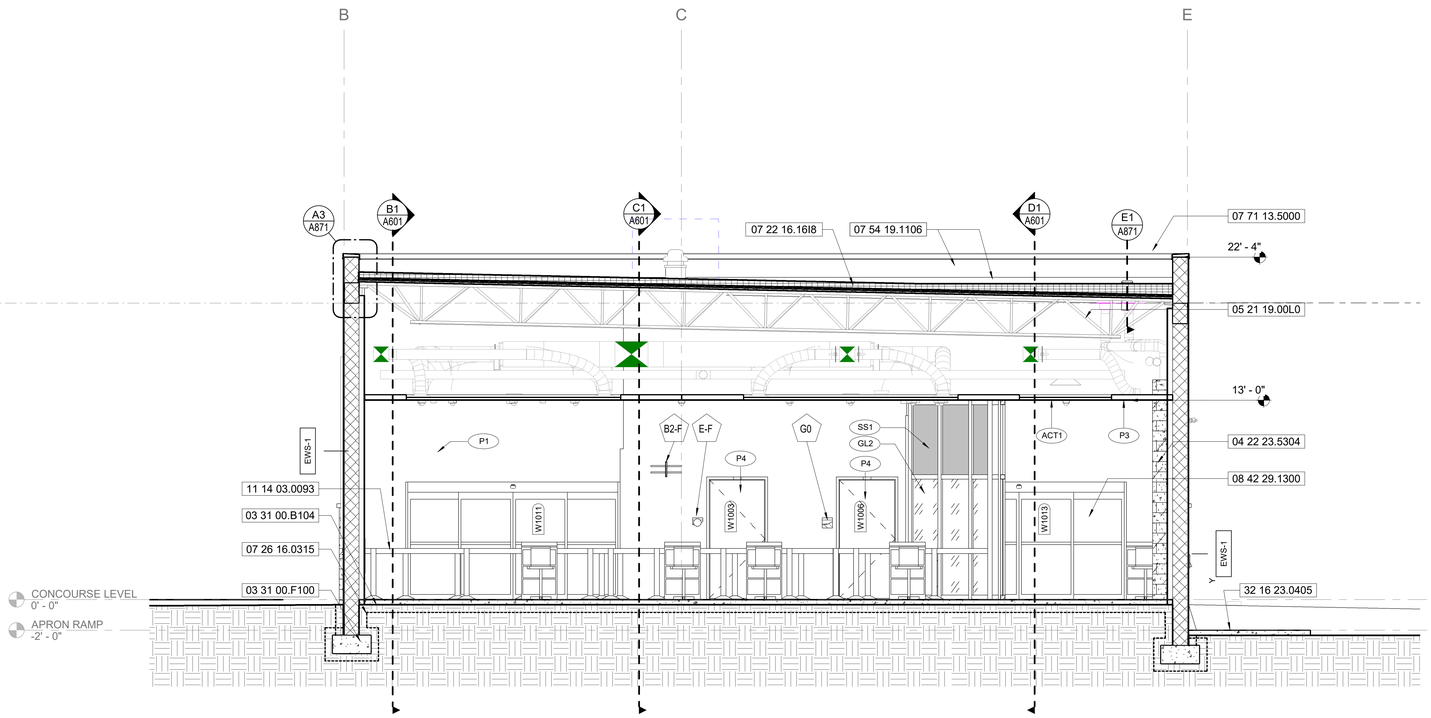
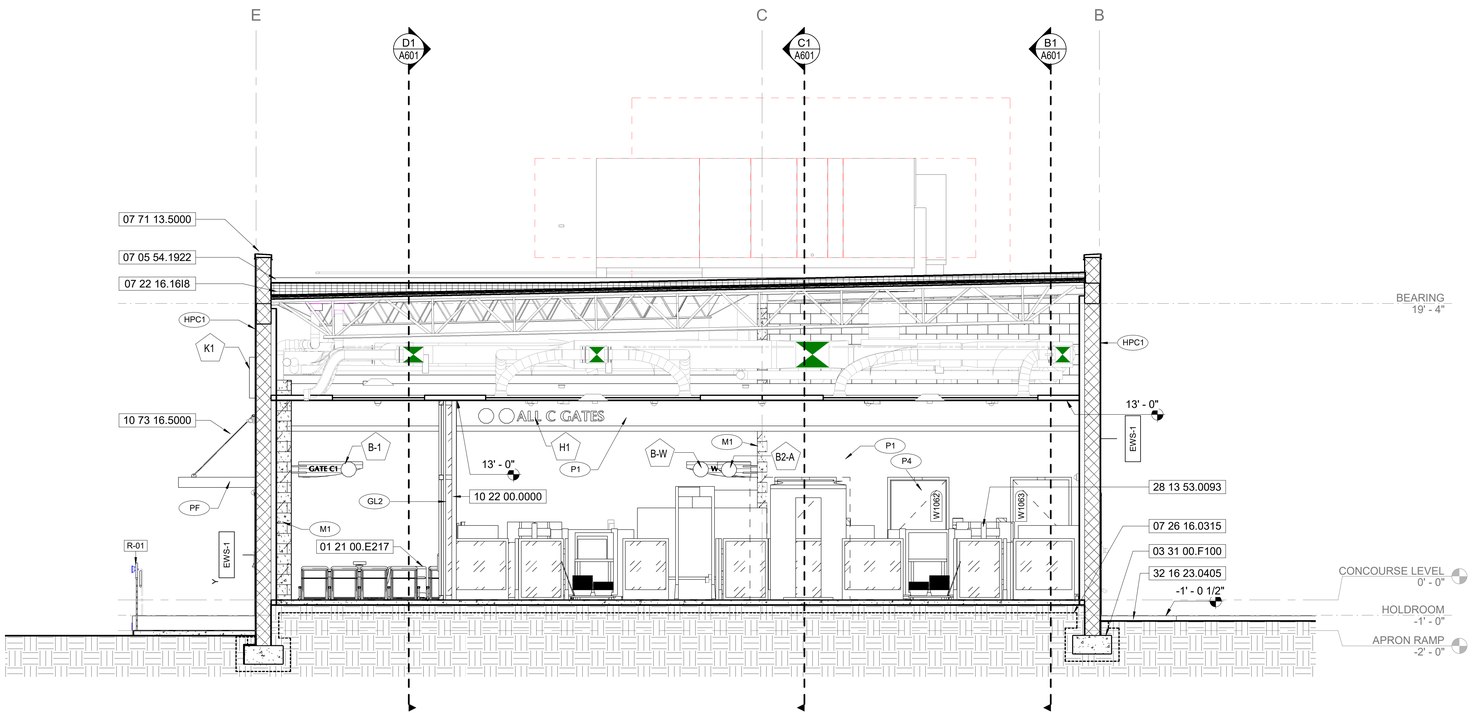


C1 BUILDING SECTION

1/4" = 1'-0"



A1 BUILDING SECTION

1/4" = 1'-0"

KEYNOTES

NO.	
01 21 00.E217	TYP. ALLOWANCE FOR FIXED MULTIPLE SEATING WORK.
03 31 00.B104	TYP. 4" STRUCTURAL SLAB-ON-GRADE, SEE STRUCTURAL.
03 31 00.F100	TYP. CONTINOUS WALL FOUNDATION, SEE STRUCTURAL.
04 22 23.5304	TYP. 4" BURNISHED CONCRETE MASONRY UNIT
05 21 19.00L0	TYP. LH SERIES LONG SPAN JOIST, SEE STRUCTURAL.
07 05 54.1922	TYP. PVC ROOFING MEMBRANE CAP/FLASHING PLY WELD.
07 22 16.16I8	TYP. 4" MIN. POLYISOCYANURATE RIGID FOAM ROOF BOARD INSULATION.
07 26 16.0315	TYP. 15 MIL BELOW GRADE VAPOR BARRIER.
07 54 19.1106	TYP. COLD ADHESIVE APPLIED, 60 MIL PVC MEMBRAINE ROOFING.
07 71 13.5000	TYP. ALUMNINUM MANUFACTURED COPING SYSTEM, INSTALLED PER MNFR. INSTRUCTIONS.
08 42 29.1300	TYP. ALUMINUM FRAMED AUTOMATIC ENTRANCE DOOR.
10 22 00.0000	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY.
10 73 16.5000	TYP. PREMANUFACTURED ALUMINUM CANOPY SYSTEM. PROVIDE SIGNED & SEALED CALCULATIONS/SHOPDRAWINGS COMPLYING W/ STRUCTURAL DESIGN LOADS.
11 14 03.0093	RETRACTABLE BELT STANCHION, NIC.
28 13 53.0093	SECURITY ACCESS, METAL DETECTORS, X-RAY, EXPLOSIVE DETECTION, BAGGAGE AND PASSANGER SCREENING EQUIPMENT, NIC CONTRCTOR TO COORDINATE POWER AND DATA REQUIREMENTS.
32 16 23.0405	TYP. 4" BROOM FINISHED CONCRETE SIDEWALK.

NOTES

1. REFER TO **A** SERIES SHEETS FOR PARTITION MARKERS AND **AL641** FOR PARTITION TYPES
2. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE.
   1t
3. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET **A711**
   101
4. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
5. ELEVATION MARKERS ARE ESTABLISHED AT CONCOURSE = 0' - 0"
6. RAILING CONSTRUCTION AND TYPES REFER TO SHEET **A865**
   1t
7. MATERIAL FINISH CODES, SEE **AF712** FIR DEFINITIONS.
   ?
8. AREA DESIGNATED FOR FUTURE WORK (NIC). CONTRACTOR SHALL KEEP THIS AREA CLEAR OF ANY BUILT ELEMENTS ABOVE AND/OR BELOW GROUND UNLESS OTHERWISE NOTED WITHIN THE SCOPE OF THIS PROJECT.
9. CONCESSION AREAS SHALL BE FIT OUT AS SHELL SPACES WITH CODE MINIMUM SYSTEMS SUPPORT AS INDICATED.

SCALE: 1/4" = 1'-0"

0 1' 2' 4' 8'

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
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MAITLAND, FL 32751
407.897.6764 (VOICE)
407.894.1338 (FAX)
WWW.MLM-MARTIN.COM
AA-C002208
OLM 308 & TYPE PROPERTY
MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	1/4" = 1'-0"

Drawing Title:

TRANSVERSE BUILDING SECTIONS

BID DOCUMENTS

Drawing No.:

A611

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

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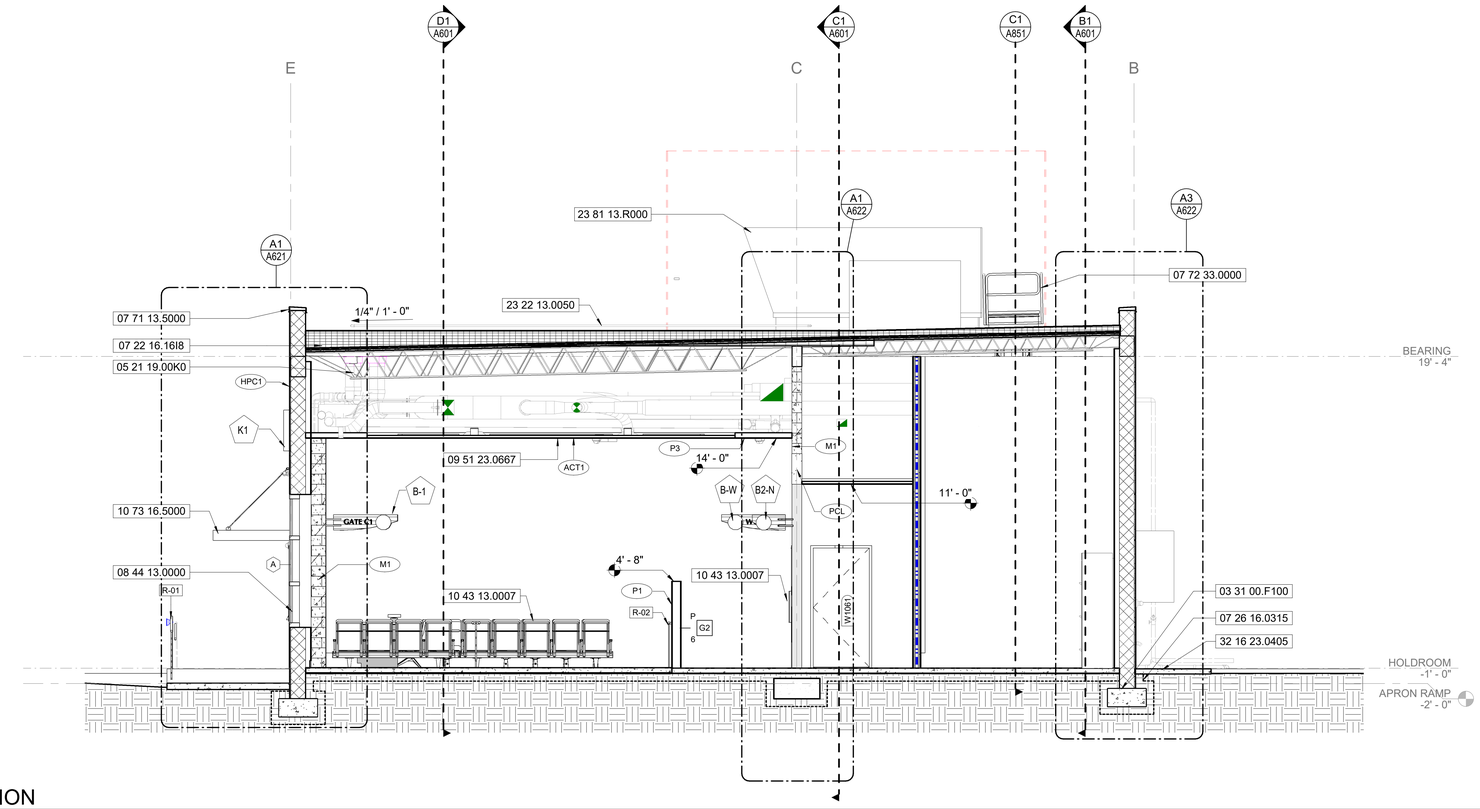
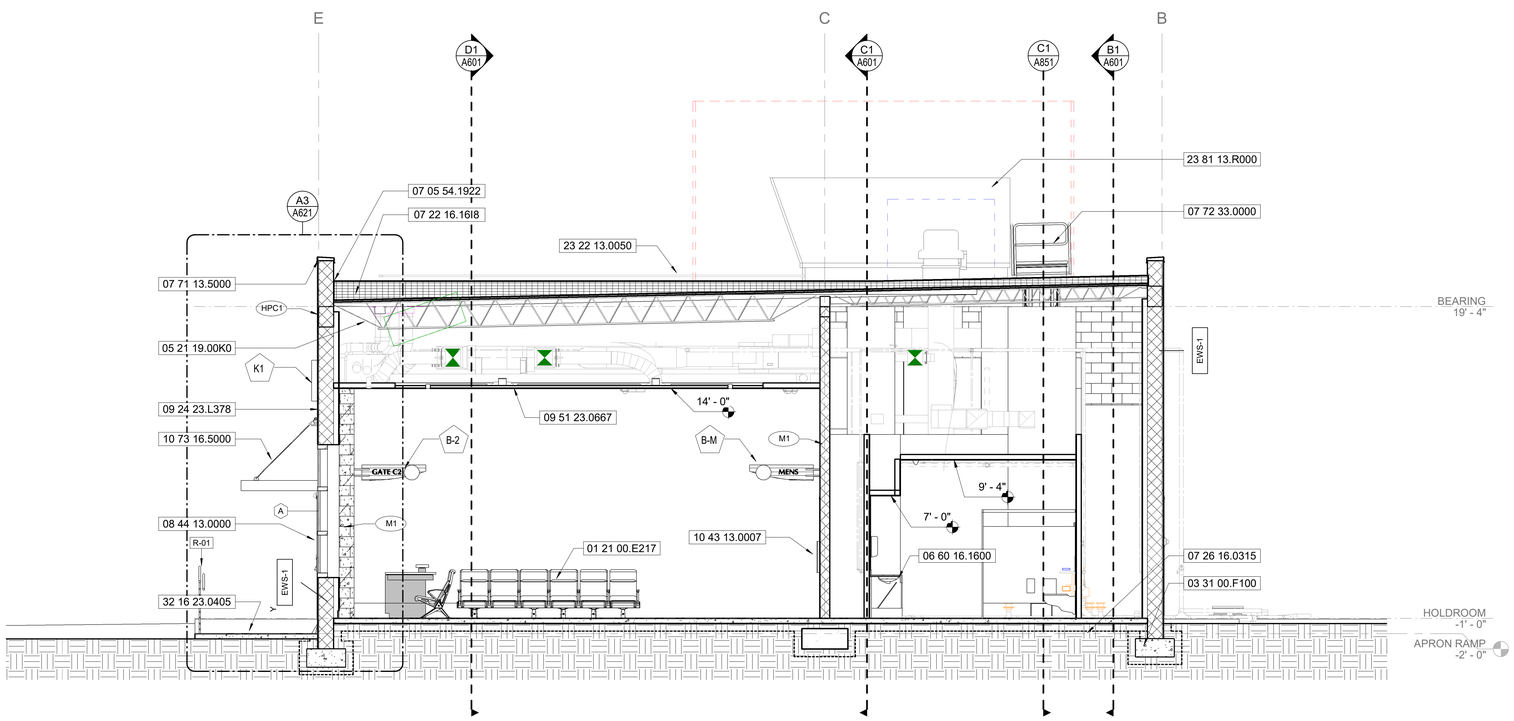


C1 BUILDING SECTION

1/4" = 1'-0"



A1 BUILDING SECTION

1/4" = 1'-0"

KEYNOTES

NO.	
01 21 00.E217	TYP. ALLOWANCE FOR FIXED MULTIPLE SEATING WORK.
03 31 00.F100	TYP. CONTINOUS WALL FOUNDATION, SEE STRUCTURAL.
05 21 19.00K0	TYP. K SERIES OPEN WEB STEEL JOIST, SEE STRUCTURAL.
06 60 16.1600	TYP. SOLID SURFACING COUNTERTOPS.
07 05 54.1922	TYP. PVC ROOFING MEMBRANE CAP/FLASHING PLY WELD.
07 22 16.16I8	TYP. 4" MIN. POLYISOCYANURATE RIGID FOAM ROOF BOARD INSULATION.
07 26 16.0315	TYP. 15 MIL BELOW GRADE VAPOR BARRIER.
07 71 13.5000	TYP. ALUMNINUM MANUFACTURED COPING SYSTEM, INSTALLED PER MNFR. INSTRUCTIONS.
07 72 33.0000	TYP. SINGLE-LEAF ROOF ACCESS HATCH W/ CURB AND SAFETY RAIL.
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
09 51 23.0667	TYP. STANDARD, 24" X 24" TEGULAR ACOUSITCAL TILE CEILING SYSTEM.
10 43 13.0007	TYP. WALL CABINENT MOUNTED AUTOMATIC ELECTRONIC DEFIBRILLATOR (AED).
10 73 16.5000	TYP. PREMANUFACTURED ALUMINUM CANOPY SYSTEM. PROVIDE SIGNED & SEALED CALCULATIONS/SHOPDRAWINGS COMPLYING W/ STRUCTURAL DESIGN LOADS.
23 22 13.0050	TYP. CONDENSATE PIPING, SEE MECH.
23 81 13.R000	TYP. PACKAGED ROOFTOP UNIT, SEE MECH.
32 16 23.0405	TYP. 4" BROOM FINISHED CONCRETE SIDEWALK.

NOTES

1. REFER TO **A** SERIES SHEETS FOR PARTITION MARKERS AND **AL641** FOR PARTITION TYPES
2. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE.
   1t
3. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET **A711**
   101
4. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
5. ELEVATION MARKERS ARE ESTABLISHED AT CONCOURSE = 0' - 0"
6. RAILING CONSTRUCTION AND TYPES REFER TO SHEET **A865**
   1t
7. MATERIAL FINISH CODES, SEE **AF712** FIR DEFINITIONS.
   ?
8. AREA DESIGNATED FOR FUTURE WORK (NIC). CONTRACTOR SHALL KEEP THIS AREA CLEAR OF ANY BUILT ELEMENTS ABOVE AND/OR BELOW GROUND UNLESS OTHERWISE NOTED WITHIN THE SCOPE OF THIS PROJECT.
9. CONCESSION AREAS SHALL BE FIT OUT AS SHELL SPACES WITH CODE MINIMUM SYSTEMS SUPPORT AS INDICATED.

SCALE: 1/4" = 1'-0"

0 1' 2' 4' 8'

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction of Satellite Concourse 'C'

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FL AR-98279

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Revisions

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Checked By:	MAM
Issue Date:	30-NOV-2020
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Drawing Title:

TRANSVERSE BUILDING SECTIONS

BID DOCUMENTS

Drawing No.:

A612

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

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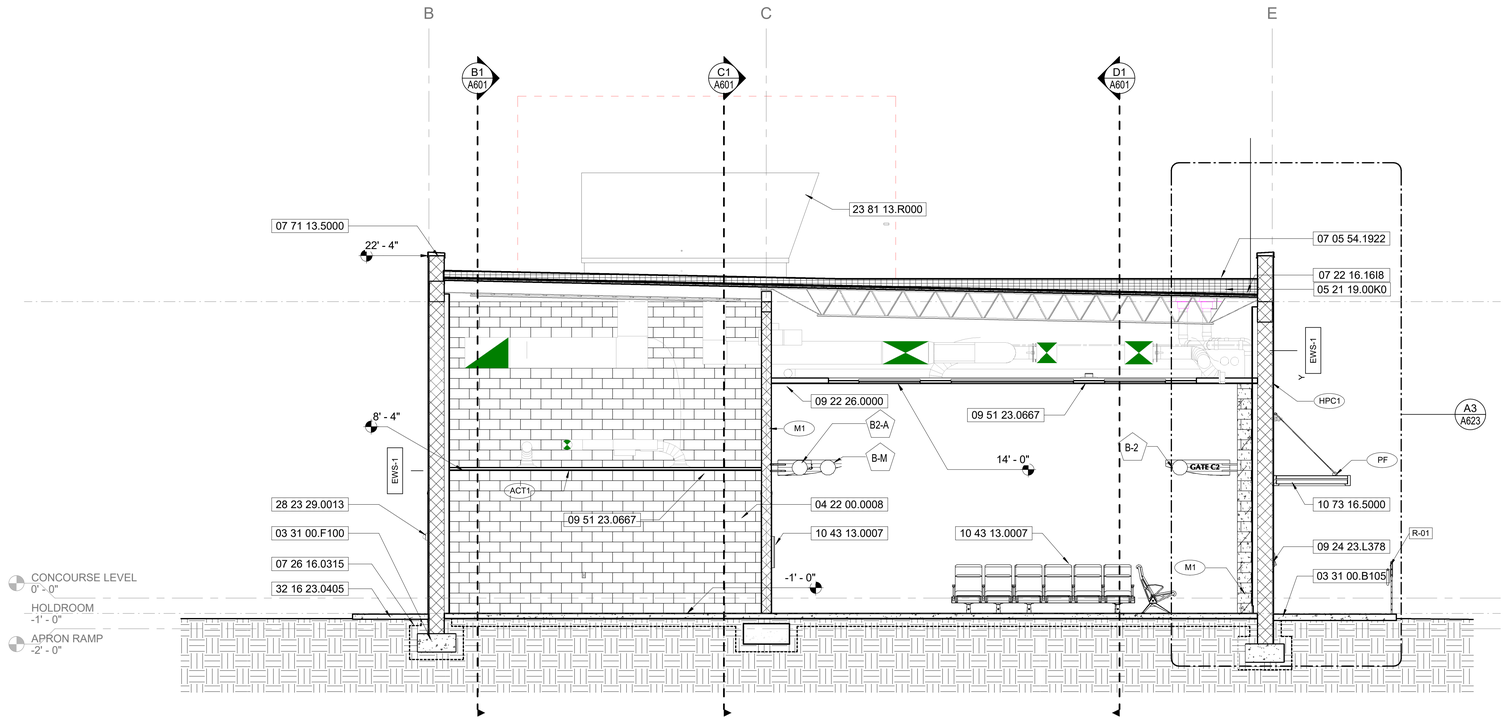
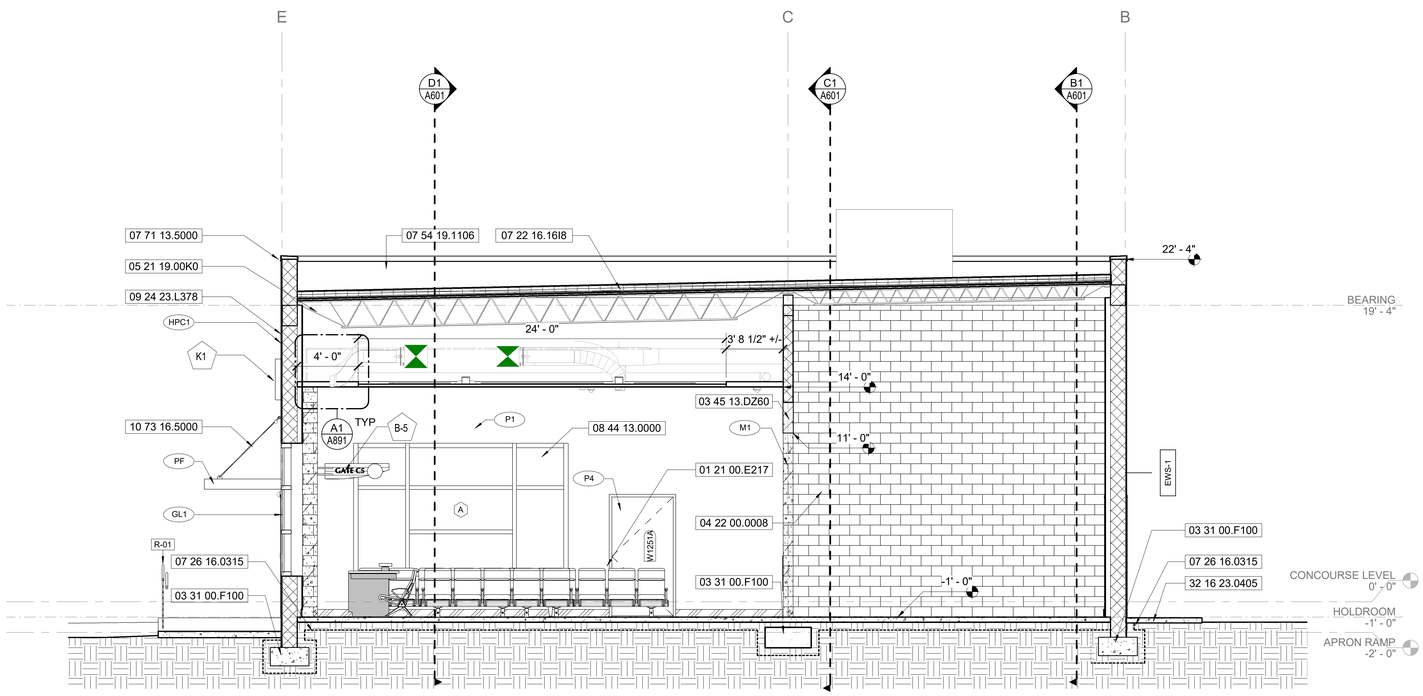


C1 BUILDING SECTION

1/4" = 1'-0"



A1 BUILDING SECTION

1/4" = 1'-0"

KEYNOTES

NO.	
01 21 00.E217	TYP. ALLOWANCE FOR FIXED MULTIPLE SEATING WORK.
03 31 00.B105	TYP. 5" CONCRETE FLOOR SLAB, SEE STRUCTURAL
03 31 00.F100	TYP. CONTINOUS WALL FOUNDATION, SEE STRUCTURAL.
03 45 13.DZ60	TYP. 8" X 24" FACED ARCHITECTURAL PRECAST CONCRETE, SAND FINISH.
04 22 00.0008	TYP. 8" NOMINAL CONCRETE MASONRY UNIT.
05 21 19.00K0	TYP. K SERIES OPEN WEB STEEL JOIST, SEE STRUCTURAL.
07 05 54.1922	TYP. PVC ROOFING MEMBRANE CAP/FLASHING PLY WELD.
07 22 16.16I8	TYP. 4" MIN. POLYISOCYANURATE RIGID FOAM ROOF BOARD INSULATION.
07 26 16.0315	TYP. 15 MIL BELOW GRADE VAPOR BARRIER.
07 54 19.1106	TYP. COLD ADHESIVE APPLIED, 60 MIL PVC MEMBRAINE ROOFING.
07 71 13.5000	TYP. ALUMNINUM MANUFACTURED COPING SYSTEM, INSTALLED PER MNFR. INSTRUCTIONS.
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
09 22 26.0000	TYP. GYPSUM ASSEMBLY SUSPENSION SYSTEM, INSTALL PER MNFR. INSTRUCTIONS.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
09 51 23.0667	TYP. STANDARD, 24" X 24" TEGULAR ACOUSITCAL TILE CEILING SYSTEM.
10 43 13.0007	TYP. WALL CABINENT MOUNTED AUTOMATIC ELECTRONIC DEFIBRILLATOR (AED).
10 73 16.5000	TYP. PREMANUFACTURED ALUMINUM CANOPY SYSTEM. PROVIDE SIGNED & SEALED CALCULATIONS/SHOPDRAWINGS COMPLYING W/ STRUCTURAL DESIGN LOADS.
23 81 13.R000	TYP. PACKAGED ROOFTOP UNIT, SEE MECH.
28 23 29.0013	TYP. VSS CAMERA, SEE SECURITY DRAWINGS
32 16 23.0405	TYP. 4" BROOM FINISHED CONCRETE SIDEWALK.

NOTES

1. REFER TO **A** SERIES SHEETS FOR PARTITION MARKERS AND **AL641** FOR PARTITION TYPES
2. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE.
   1t
3. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET **A711**
   101
4. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
5. ELEVATION MARKERS ARE ESTABLISHED AT CONCOURSE = 0' - 0"
6. RAILING CONSTRUCTION AND TYPES REFER TO SHEET **A865**
   1t
7. MATERIAL FINISH CODES, SEE **AF712** FIR DEFINITIONS.
   ?
8. AREA DESIGNATED FOR FUTURE WORK (NIC). CONTRACTOR SHALL KEEP THIS AREA CLEAR OF ANY BUILT ELEMENTS ABOVE AND/OR BELOW GROUND UNLESS OTHERWISE NOTED WITHIN THE SCOPE OF THIS PROJECT.
9. CONCESSION AREAS SHALL BE FIT OUT AS SHELL SPACES WITH CODE MINIMUM SYSTEMS SUPPORT AS INDICATED.

SCALE: 1/4" = 1'-0"

0 1' 2' 4' 8'

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction of Satellite Concourse 'C'

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ALM 308-F TYPE PROPERTY

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FL AR-98279

SEAL

Revisions

No.	Date	Description

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Drawing Title:

TRANSVERSE BUILDING SECTIONS

BID DOCUMENTS

Drawing No.:

A613

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

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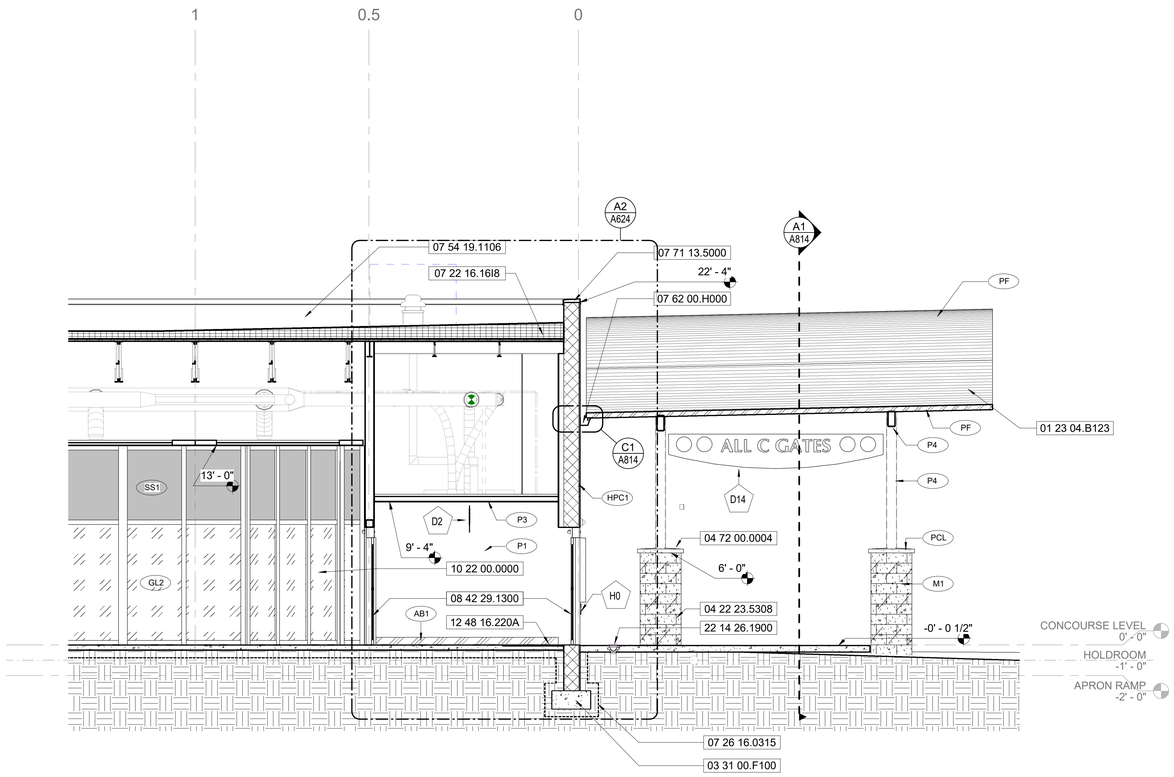

A1 PARTIAL BUILDING SECTION

1/4" = 1'-0"

KEYNOTES

NO.	
01 23 04.B123	TYP. ALTERNATE 4 CANOPY CONTRUCTION WORK.
03 31 00.F100	TYP. CONTINOUS WALL FOUNDATION, SEE STRUCTURAL.
04 22 23.5308	TYP. 8" BURNISHED CONCRETE MASONRY UNIT
04 72 00.0004	TYP. CAST STONE CAP TO MATCH EXISTING, 4" TALL.
07 22 16.16I8	TYP. 4" MIN. POLYISOCYANURATE RIGID FOAM ROOF BOARD INSULATION.
07 26 16.0315	TYP. 15 MIL BELOW GRADE VAPOR BARRIER.
07 54 19.1106	TYP. COLD ADHESIVE APPLIED, 60 MIL PVC MEMBRAINE ROOFING.
07 62 00.H000	TYP. 8" X 6" BEVELED ALUMINUM GUTTER.
07 71 13.5000	TYP. ALUMNINUM MANUFACTURED COPING SYSTEM, INSTALLED PER MNFR. INSTRUCTIONS.
08 42 29.1300	TYP. ALUMINUM FRAMED AUTOMATIC ENTRANCE DOOR.
10 22 00.0000	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY.
12 48 16.220A	TYP. 5/8" SS 304 WALKOFF ENTRY MAT.
22 14 26.1900	TYP. FACILITY STORM TRENCH DRAIN, SEE PLUMBING.

NOTES

1. REFER TO **A** SERIES SHEETS FOR PARTITION MARKERS AND **AL641** FOR PARTITION TYPES
2. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE.
   1t
3. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET **A711**
   101
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   1t
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9. CONCESSION AREAS SHALL BE FIT OUT AS SHELL SPACES WITH CODE MINIMUM SYSTEMS SUPPORT AS INDICATED.

SCALE: 1/4" = 1'-0"

0 1' 2' 4' 8'

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction of Satellite Concourse 'C'

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FL AR-98279

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Drawing Title:

TRANSVERSE BUILDING SECTIONS

BID DOCUMENTS

Drawing No.:

A614

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

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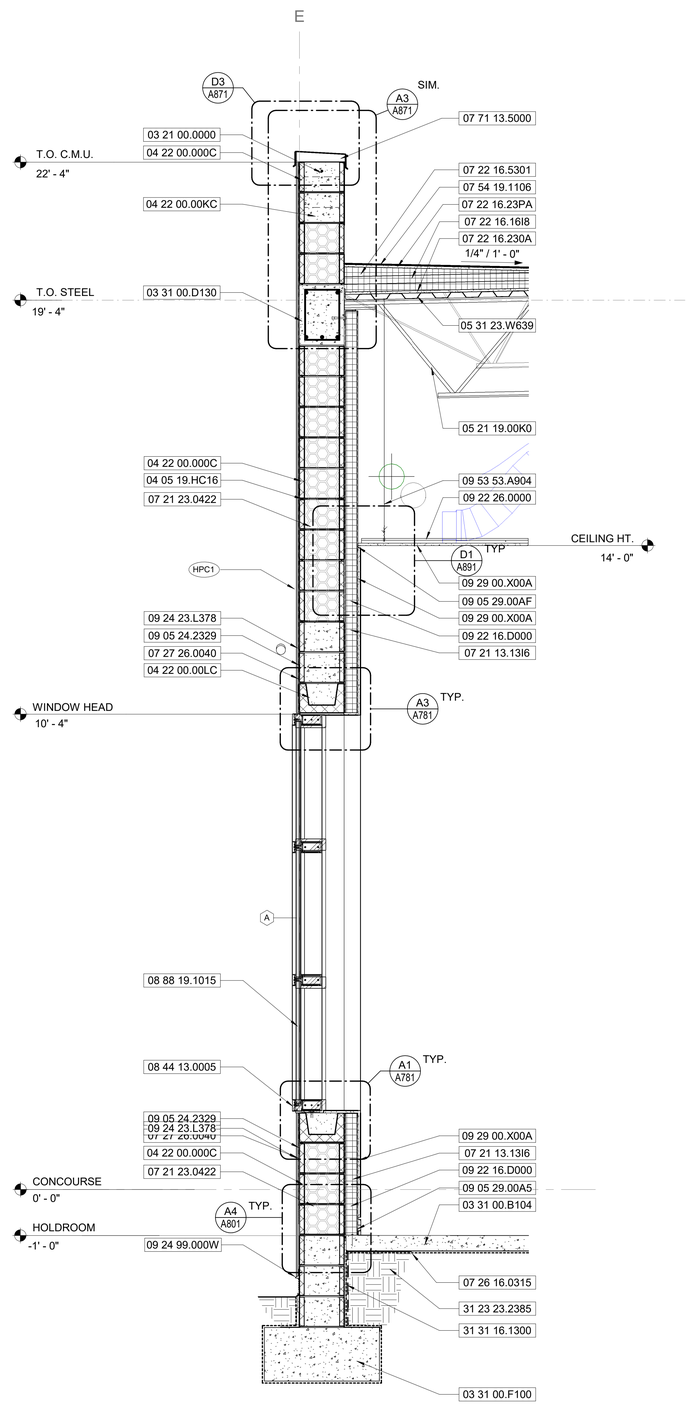
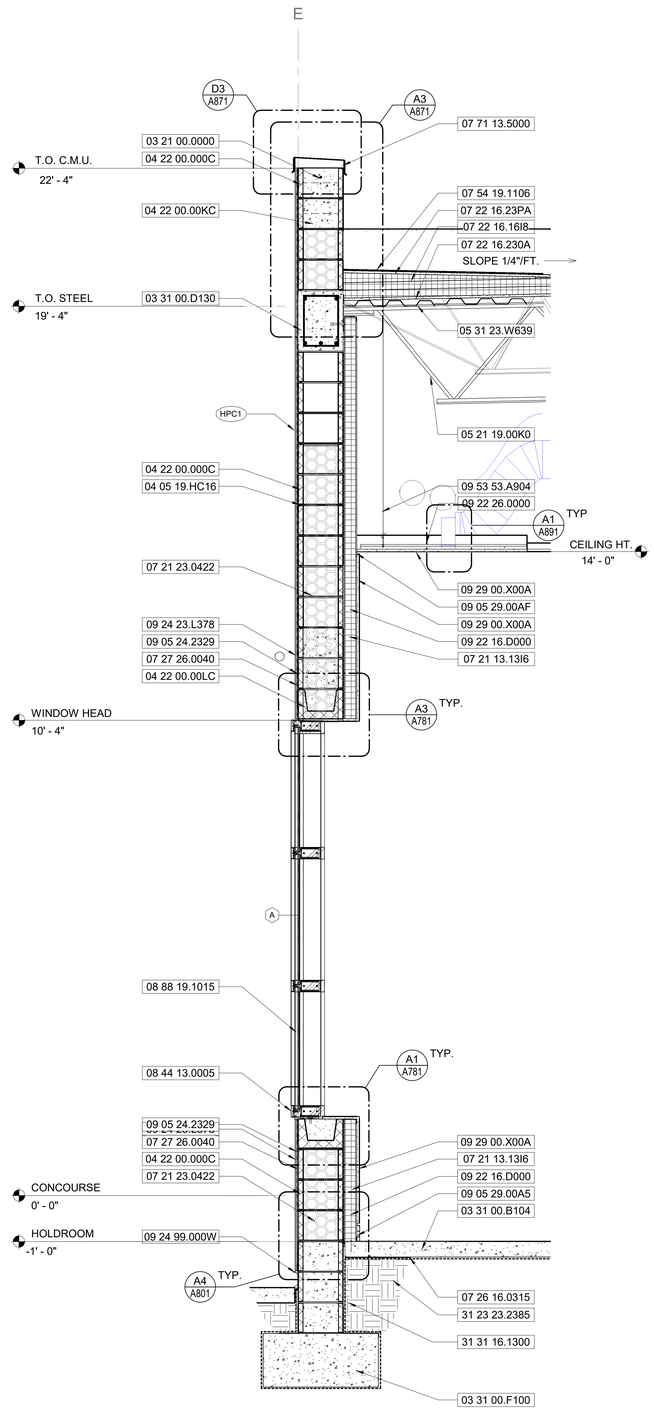


A1 WALL SECTION

3/4" = 1'-0"



A3 WALL SECTION

3/4" = 1'-0"

KEYNOTES

NO.	
03 21 00.0000	TYP. CONCRETE REINFORCING STEEL BAR(S), SEE STRUCTURAL.
03 31 00.B104	TYP. 4" STRUCTURAL SLAB-ON-GRADE, SEE STRUCTURAL.
03 31 00.D130	TYP. 12" X 16" CAST-IN-PLACE BEAM, SEE STRUCTURAL
03 31 00.F100	TYP. CONTINOUS WALL FOUNDATION, SEE STRUCTURAL.
04 05 19.HC16	TYP. MASONRY HORIZONTAL GALVANIZED WIRE REINFORCING @ 16" O.C. MAX
04 22 00.000C	TYP. 12" NOMINAL CONCRETE MASONRY UNIT
04 22 00.00KC	TYP. 12" NOMINAL GROUT FILLED CONCRETE MASONRY KNOCK-OUT UNIT.
04 22 00.00LC	TYP. 12" NOM. LINTEL CONCRETE MASONRY UNIT.

KEYNOTES

NO.	
05 21 19.00K0	TYP. K SERIES OPEN WEB STEEL JOIST, SEE STRUCTURAL.
05 31 23.W639	TYP. 1-1/2" WR 20 GA. G90 STEEL ROOF DECK, SEE STRUCTURAL.
07 21 13.13I6	TYP. 3" THICK, POLYISOCYANURATE RIGID FOAM BOARD INSULATION.
07 21 23.0422	TYP. FILL ALL UN-GROUTED CELLS WITH INJECTED FOAM FILL INSULATION.
07 22 16.16I8	TYP. 4" MIN. POLYISOCYANURATE RIGID FOAM ROOF BOARD INSULATION.
07 22 16.23PA	TYP. 5/8" PRIMED DENS DECK ROOF INSULATION COVER BOARD.
07 22 16.230A	TYP. 5/8" DENS DECK ROOF INSULATION COVER BOARD.
07 22 16.5301	TYP. PROVIDE TAPERED RIGID INSULATION BYOND MIN. THICKNESS REQUIREMENT TO ENSURE POSITIVE DRAINAGE TO ROOF DRAINS.
07 26 16.0315	TYP. 15 MIL BELOW GRADE VAPOR BARRIER.
07 27 26.0040	TYP. 40 MILL THICK FLUID-APPLIED MEMBRANE VAPOR RETARDING AIR BARRIER.
07 54 19.1106	TYP. COLD ADHESIVE APPLIED, 60 MIL PVC MEMBRAINE ROOFING.
07 71 13.5000	TYP. ALUMNINUM MANUFACTURED COPING SYSTEM, INSTALLED PER MNFR. INSTRUCTIONS.
08 44 13.0005	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY - SILL EXTRUSION WITH MNFR. FLASHING CLIP.
08 88 19.1015	TYP. 1-5/16" HURRICANE-RESISTANT INSULATED GLAZING UNIT.
09 05 24.2329	TYP. PAPER BACKED SELF FURRING GALV. LATH.
09 05 29.00A5	TYP. ALUMINUM GYPSUM BOARD REVEAL BASE ACCESSORY.
09 05 29.00AF	TYP. ALUMINUM GYPSUM BOARD 'F' REVEAL ACCESSORY.
09 22 16.D000	TYPICAL 3 5/8" GALV. METAL STUD FRAMING @ 24" OC UNO.
09 22 26.0000	TYP. GYPSUM ASSEMBLY SUSPENSION SYSTEM, INSTALL PER MNFR. INSTRUCTIONS.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
09 24 99.000W	TYP. CEMENT PLASTERING WEEP SCREED ACESSORY.
09 29 00.X00A	TYPICAL 5/8" TYPE 'X' GYPSUM WALL BOARD
09 53 53.A904	TYPICAL 9 GAUGE GALV. METAL HANGER WIRE @ 48" O.C. EACH WAY
31 23 23.2385	TYP. COMPACTED FILL TO A MIN. OF 85% COMPACTION AS PER ASTM D1557.
31 31 16.1300	TYP. SPRAY TERMITE TOXICANT BARRIER.

NOTES

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2. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE. (1t)
3. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET **A711** (101)
4. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
5. ELEVATION MARKERS ARE ESTABLISHED AT CONCOURSE = 0' - 0"
6. RAILING CONSTRUCTION AND TYPES REFER TO SHEET **A865** (1t)
7. MATERIAL FINISH CODES, SEE **AF712** FIR DEFINITIONS. (?)
8. AREA DESIGNATED FOR FUTURE WORK (NIC). CONTRACTOR SHALL KEEP THIS AREA CLEAR OF ANY BUILT ELEMENTS ABOVE AND/OR BELOW GROUND UNLESS OTHERWISE NOTED WITHIN THE SCOPE OF THIS PROJECT.
9. CONCESSION AREAS SHALL BE FIT OUT AS SHELL SPACES WITH CODE MINIMUM SYSTEMS SUPPORT AS INDICATED.

SCALE: 3/4" = 1'-0"

0 4" 8" 16" 32"

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Drawing Title:

ENLARGED WALL SECTIONS

BID DOCUMENTS

Drawing No.:

A621

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt
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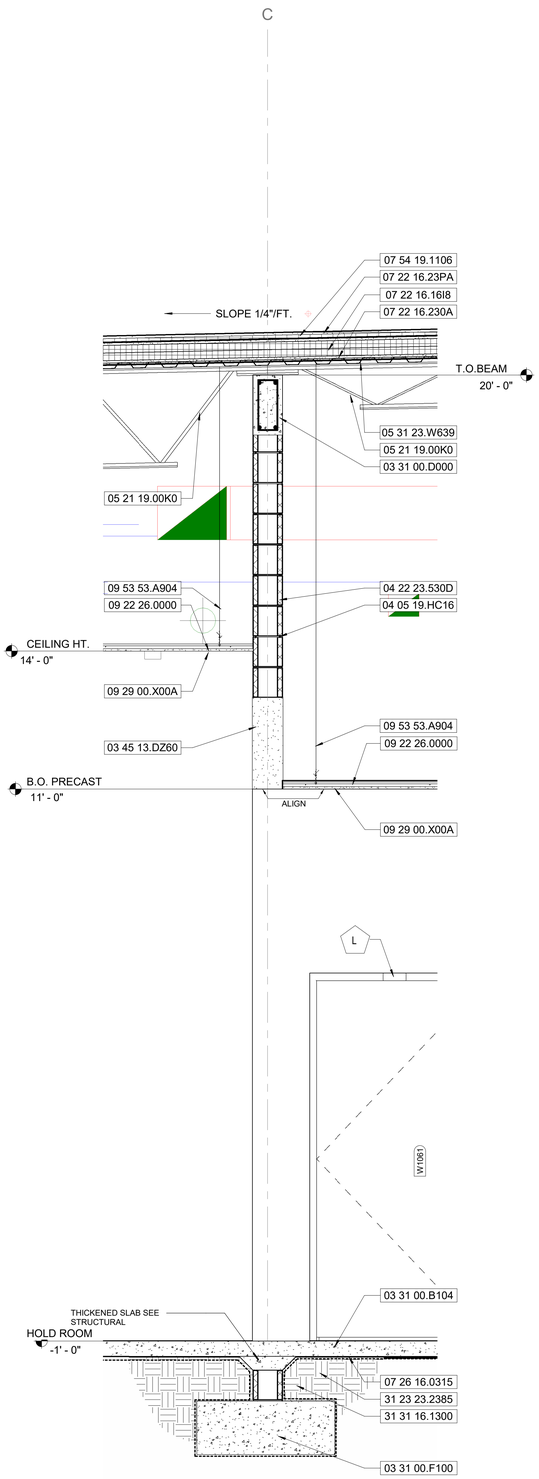
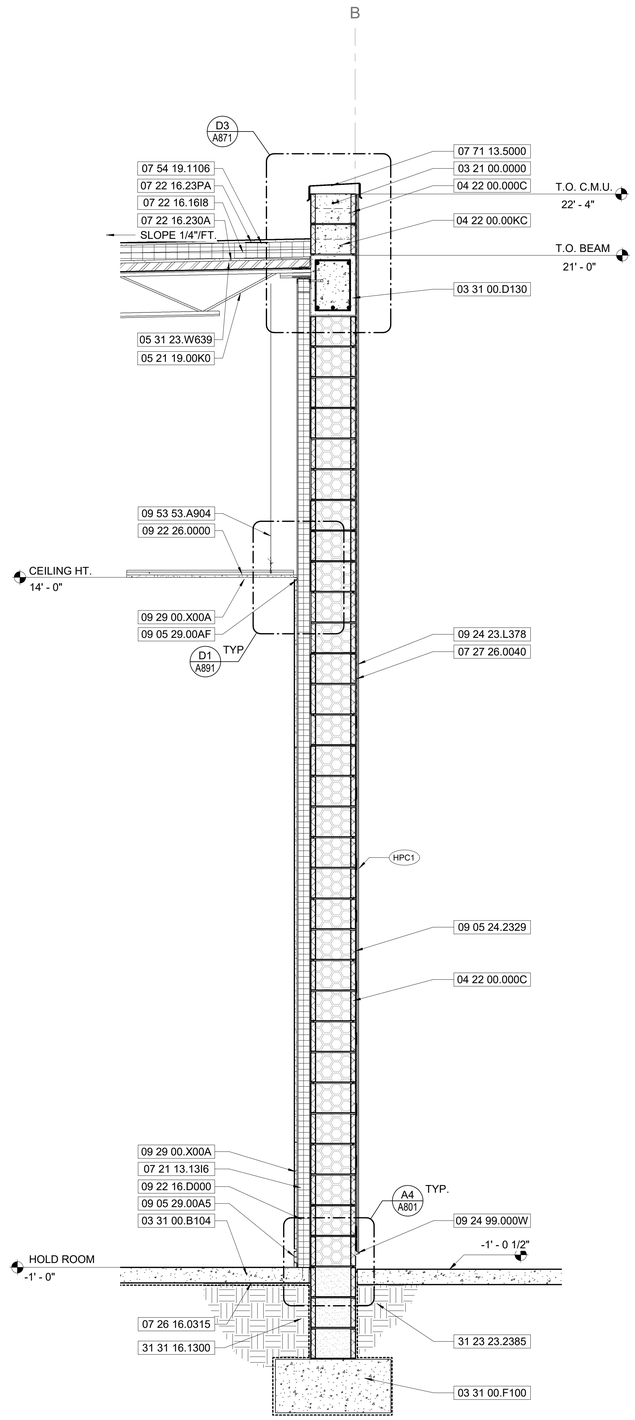


A1 WALL SECTION

3/4" = 1'-0"



A3 WALL SECTION

3/4" = 1'-0"

KEYNOTES

NO.	
03 21 00.0000	TYP. CONCRETE REINFORCING STEEL BAR(S), SEE STRUCTURAL.
03 31 00.B104	TYP. 4" STRUCTURAL SLAB-ON-GRADE, SEE STRUCTURAL.
03 31 00.D000	TYP. CONCRETE CAST-IN-PLACE BEAM, SEE STRUCTURAL
03 31 00.D130	TYP. 12" X 16" CAST-IN-PLACE BEAM, SEE STRUCTURAL
03 31 00.F100	TYP. CONTINOUS WALL FOUNDATION, SEE STRUCTURAL.
03 45 13.DZ60	TYP. 8" X 24" FACED ARCHITECTURAL PRECAST CONCRETE, SAND FINISH.

KEYNOTES

NO.	
04 05 19.HC16	TYP. MASONRY HORIZONTAL GALVANIZED WIRE REINFORCING @ 16" O.C. MAX
04 22 00.000C	TYP. 12" NOMINAL CONCRETE MASONRY UNIT
04 22 00.00KC	TYP. 12" NOMINAL GROUT FILLED CONCRETE MASONRY KNOCK-OUT UNIT.
04 22 23.530D	TYP. BURNISHED 2 FACE CONCRETE MASONRY UNIT
05 21 19.00K0	TYP. K SERIES OPEN WEB STEEL JOIST, SEE STRUCTURAL.
05 31 23.W639	TYP. 1-1/2" WR 20 GA. G90 STEEL ROOF DECK, SEE STRUCTURAL.
07 21 13.13I6	TYP. 3" THICK, POLYISOCYANURATE RIGID FOAM BOARD INSULATION.
07 22 16.16I8	TYP. 4" MIN. POLYISOCYANURATE RIGID FOAM ROOF BOARD INSULATION.
07 22 16.23PA	TYP. 5/8" PRIMED DENS DECK ROOF INSULATION COVER BOARD.
07 22 16.230A	TYP. 5/8" DENS DECK ROOF INSULATION COVER BOARD.
07 26 16.0315	TYP. 15 MIL BELOW GRADE VAPOR BARRIER.
07 27 26.0040	TYP. 40 MILL THICK FLUID-APPLIED MEMBRANE VAPOR RETARDING AIR BARRIER.
07 54 19.1106	TYP. COLD ADHESIVE APPLIED, 60 MIL PVC MEMBRAINE ROOFING.
07 71 13.5000	TYP. ALUMNINUM MANUFACTURED COPING SYSTEM, INSTALLED PER MNFR. INSTRUCTIONS.
09 05 24.2329	TYP. PAPER BACKED SELF FURRING GALV. LATH.
09 05 29.00A5	TYP. ALUMINUM GYPSUM BOARD REVEAL BASE ACCESSORY.
09 05 29.00AF	TYP. ALUMINUM GYPSUM BOARD 'F' REVEAL ACCESSORY.
09 22 16.D000	TYPICAL 3 5/8" GALV. METAL STUD FRAMING @ 24" OC UNO.
09 22 26.0000	TYP. GYPSUM ASSEMBLY SUSPENSION SYSTEM, INSTALL PER MNFR. INSTRUCTIONS.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
09 24 99.000W	TYP. CEMENT PLASTERING WEEP SCREED ACESSORY.
09 29 00.X00A	TYPICAL 5/8" TYPE 'X' GYPSUM WALL BOARD
09 53 53.A904	TYPICAL 9 GAUGE GALV. METAL HANGER WIRE @ 48" O.C. EACH WAY
31 23 23.2385	TYP. COMPACTED FILL TO A MIN. OF 85% COMPACTION AS PER ASTM D1557.
31 31 16.1300	TYP. SPRAY TERMITE TOXICANT BARRIER.

NOTES

1. REFER TO **A** SERIES SHEETS FOR PARTITION MARKERS AND **AL641** FOR PARTITION TYPES
2. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE.
   1t
3. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET **A711**
   101
4. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
5. ELEVATION MARKERS ARE ESTABLISHED AT CONCOURSE = 0' - 0"
6. RAILING CONSTRUCTION AND TYPES REFER TO SHEET **A865**
   1t
7. MATERIAL FINISH CODES, SEE **AF712** FIR DEFINITIONS.
   ?
8. AREA DESIGNATED FOR FUTURE WORK (NIC). CONTRACTOR SHALL KEEP THIS AREA CLEAR OF ANY BUILT ELEMENTS ABOVE AND/OR BELOW GROUND UNLESS OTHERWISE NOTED WITHIN THE SCOPE OF THIS PROJECT.
9. CONCESSION AREAS SHALL BE FIT OUT AS SHELL SPACES WITH CODE MINIMUM SYSTEMS SUPPORT AS INDICATED.

SCALE: 3/4" = 1'-0"

0 4" 8" 16" 32"

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
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AA-C002208
ALM 308-F TYPE PROPERTY
MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/4" = 1'-0"

Drawing Title:

ENLARGED WALL SECTIONS

BID DOCUMENTS

Drawing No.:

A622

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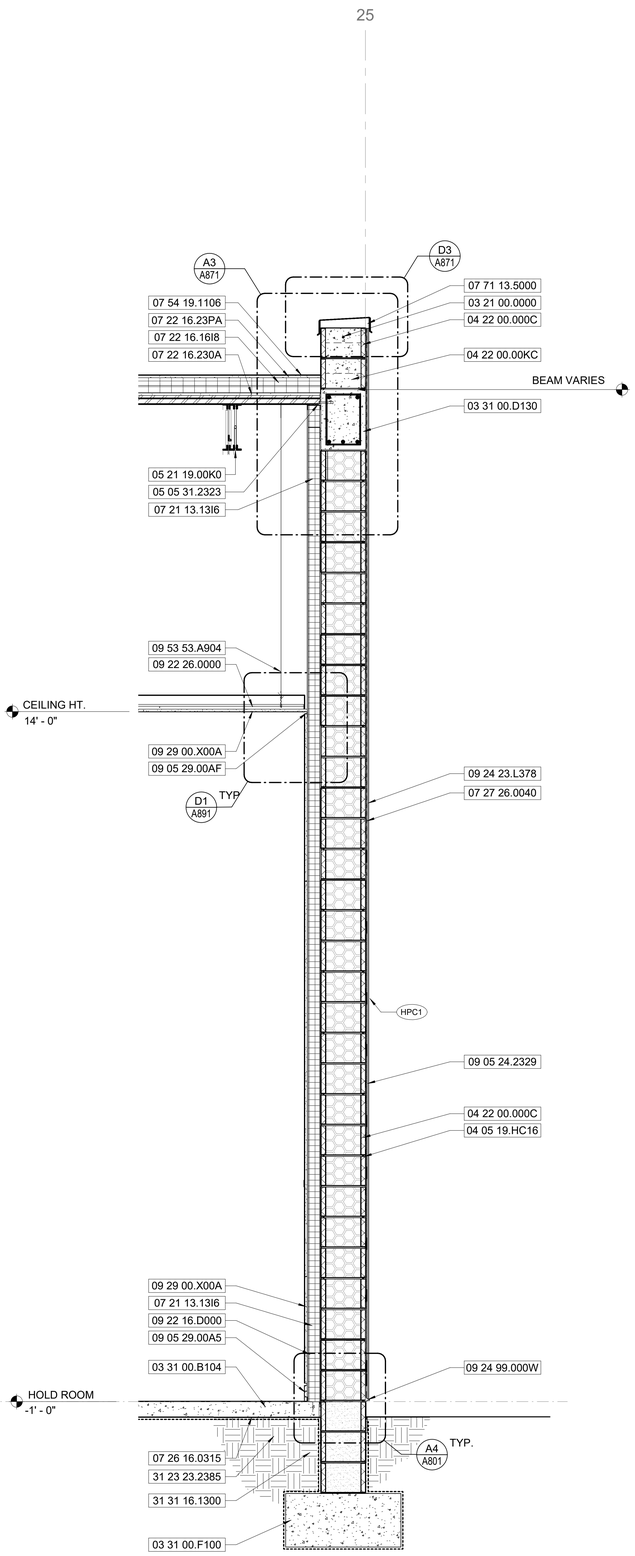
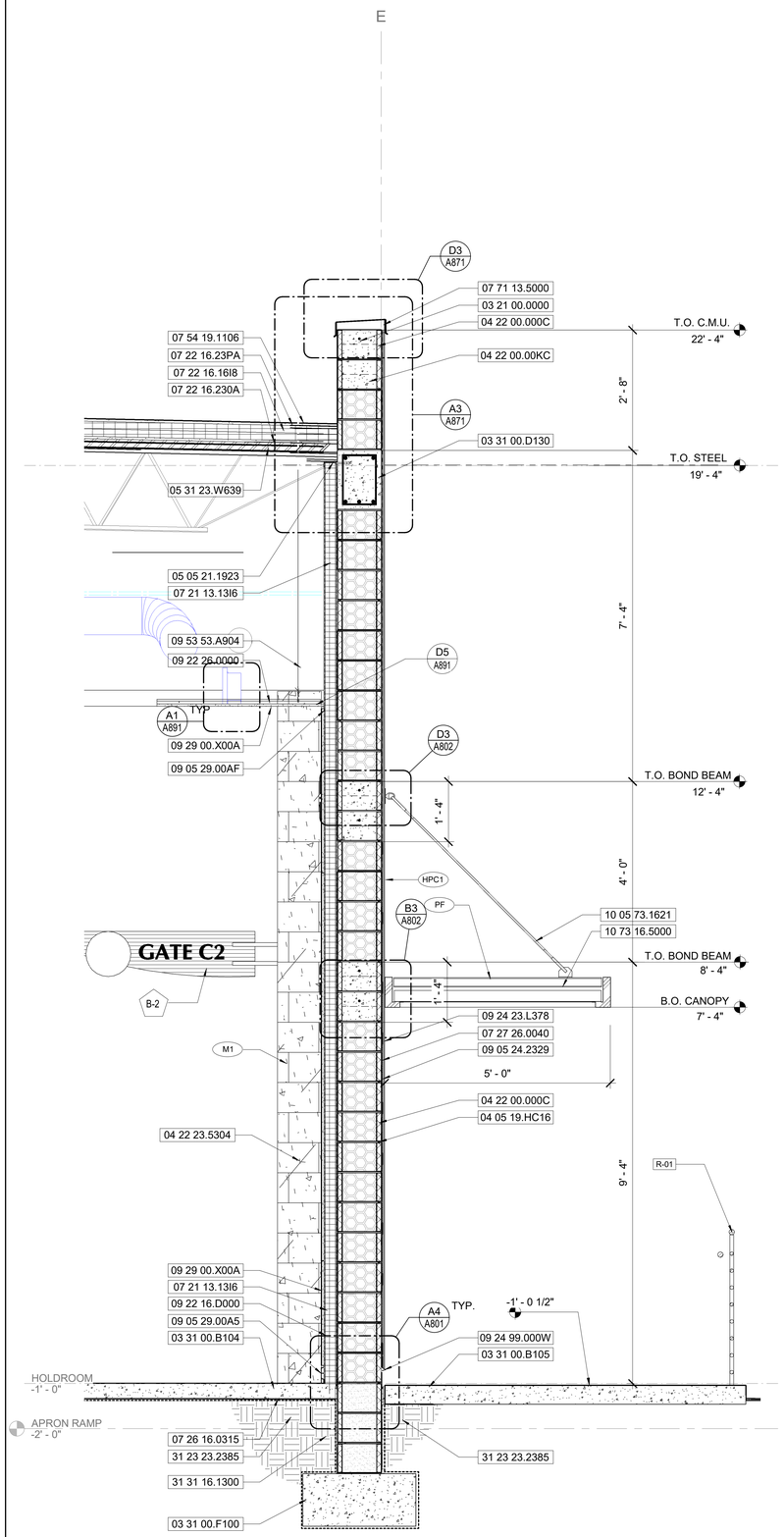


A1 WALL SECTION

3/4" = 1'-0"



A3 WALL SECTION

3/4" = 1'-0"

KEYNOTES

NO.	
03 21 00.0000	TYP. CONCRETE REINFORCING STEEL BAR(S), SEE STRUCTURAL.
03 31 00.B104	TYP. 4" STRUCTURAL SLAB-ON-GRADE, SEE STRUCTURAL.
03 31 00.B105	TYP. 5" CONCRETE FLOOR SLAB, SEE STRUCTURAL
03 31 00.D130	TYP. 12" X 16" CAST-IN-PLACE BEAM, SEE STRUCTURAL
03 31 00.F100	TYP. CONTINOUS WALL FOUNDATION, SEE STRUCTURAL.
04 05 19.HC16	TYP. MASONRY HORIZONTAL GALVANIZED WIRE REINFORCING @ 16" O.C. MAX
04 22 00.000C	TYP. 12" NOMINAL CONCRETE MASONRY UNIT
04 22 00.00KC	TYP. 12" NOMINAL GROUT FILLED CONCRETE MASONRY KNOCK-OUT UNIT.
04 22 23.5304	TYP. 4" BURNISHED CONCRETE MASONRY UNIT

KEYNOTES

NO.	
05 05 21.1923	TYP. JOIST BEARING ANGLE, REF. STRUC.
05 05 31.2323	TYP. ROOF DECK CLOSURE, REF. STRUC.
05 21 19.00K0	TYP. K SERIES OPEN WEB STEEL JOIST, SEE STRUCTURAL.
05 31 23.W639	TYP. 1-1/2" WR 20 GA. G90 STEEL ROOF DECK, SEE STRUCTURAL.
07 21 13.13I6	TYP. 3" THICK, POLYISOCYANURATE RIGID FOAM BOARD INSULATION.
07 22 16.16I8	TYP. 4" MIN. POLYISOCYANURATE RIGID FOAM ROOF BOARD INSULATION.
07 22 16.23PA	TYP. 5/8" PRIMED DENS DECK ROOF INSULATION COVER BOARD.
07 22 16.230A	TYP. 5/8" DENS DECK ROOF INSULATION COVER BOARD.
07 26 16.0315	TYP. 15 MIL BELOW GRADE VAPOR BARRIER.
07 27 26.0040	TYP. 40 MILL THICK FLUID-APPLIED MEMBRANE VAPOR RETARDING AIR BARRIER.
07 54 19.1106	TYP. COLD ADHESIVE APPLIED, 60 MIL PVC MEMBRAINE ROOFING.
07 71 13.5000	TYP. ALUMNINUM MANUFACTURED COPING SYSTEM, INSTALLED PER MNFR. INSTRUCTIONS.
09 05 24.2329	TYP. PAPER BACKED SELF FURRING GALV. LATH.
09 05 29.00A5	TYP. ALUMINUM GYPSUM BOARD REVEAL BASE ACCESSORY.
09 05 29.00AF	TYP. ALUMINUM GYPSUM BOARD 'F' REVEAL ACCESSORY.
09 22 16.D000	TYPICAL 3 5/8" GALV. METAL STUD FRAMING @ 24" OC UNO.
09 22 26.0000	TYP. GYPSUM ASSEMBLY SUSPENSION SYSTEM, INSTALL PER MNFR. INSTRUCTIONS.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
09 24 99.000W	TYP. CEMENT PLASTERING WEEP SCREED ACESSORY.
09 29 00.X00A	TYPICAL 5/8" TYPE 'X' GYPSUM WALL BOARD
09 53 53.A904	TYPICAL 9 GAUGE GALV. METAL HANGER WIRE @ 48" O.C. EACH WAY
10 05 73.1621	TYP. CANOPY SUPPORT TENSION ROD.
10 73 16.5000	TYP. PREMANUFACTURED ALUMINUM CANOPY SYSTEM. PROVIDE SIGNED & SEALED CALCULATIONS/SHOPDRAWINGS COMPLYING W/ STRUCTURAL DESIGN LOADS.
31 23 23.2385	TYP. COMPACTED FILL TO A MIN. OF 85% COMPACTION AS PER ASTM D1557.
31 31 16.1300	TYP. SPRAY TERMITE TOXICANT BARRIER.

NOTES

1. REFER TO **A** SERIES SHEETS FOR PARTITION MARKERS AND **AL641** FOR PARTITION TYPES
2. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE.
   1t
3. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET **A711**
   101
4. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
5. ELEVATION MARKERS ARE ESTABLISHED AT CONCOURSE = 0' - 0"
6. RAILING CONSTRUCTION AND TYPES REFER TO SHEET **A865**
   1t
7. MATERIAL FINISH CODES, SEE **AF712** FIR DEFINITIONS.
   ?
8. AREA DESIGNATED FOR FUTURE WORK (NIC). CONTRACTOR SHALL KEEP THIS AREA CLEAR OF ANY BUILT ELEMENTS ABOVE AND/OR BELOW GROUND UNLESS OTHERWISE NOTED WITHIN THE SCOPE OF THIS PROJECT.
9. CONCESSION AREAS SHALL BE FIT OUT AS SHELL SPACES WITH CODE MINIMUM SYSTEMS SUPPORT AS INDICATED.

SCALE: 3/4" = 1'-0"

0 4" 8" 16" 32"

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
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ULM 30B-F TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/4" = 1'-0"

Drawing Title:

ENLARGED WALL SECTIONS

BID DOCUMENTS

Drawing No.:

A623

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt
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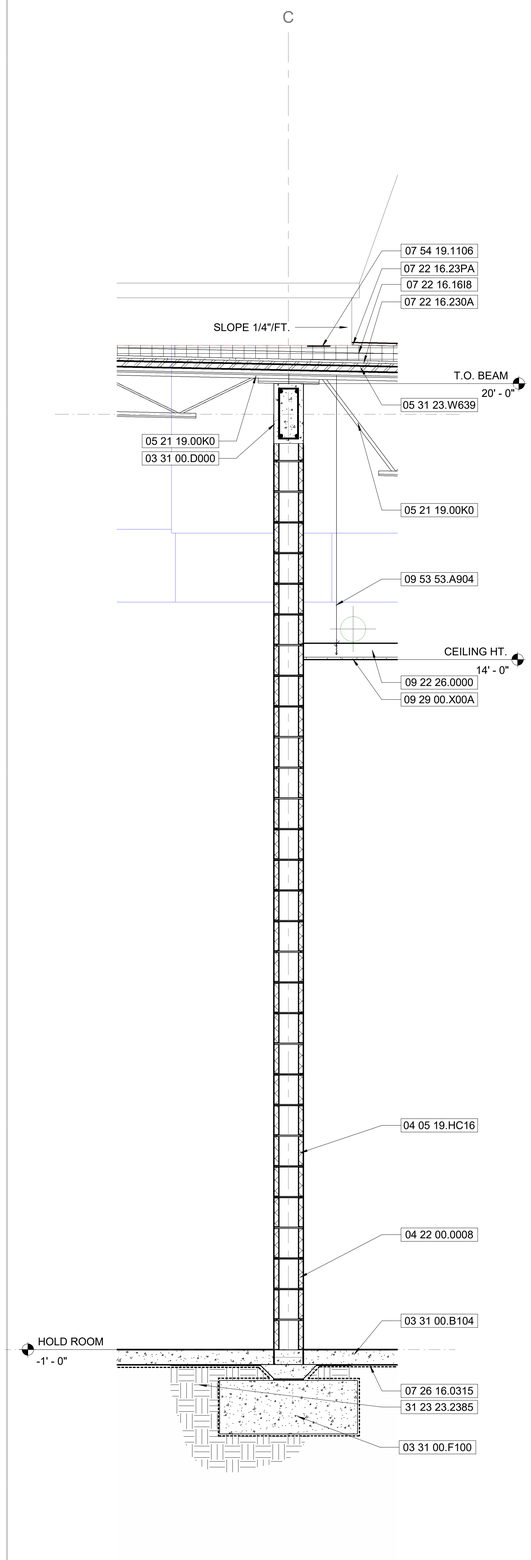
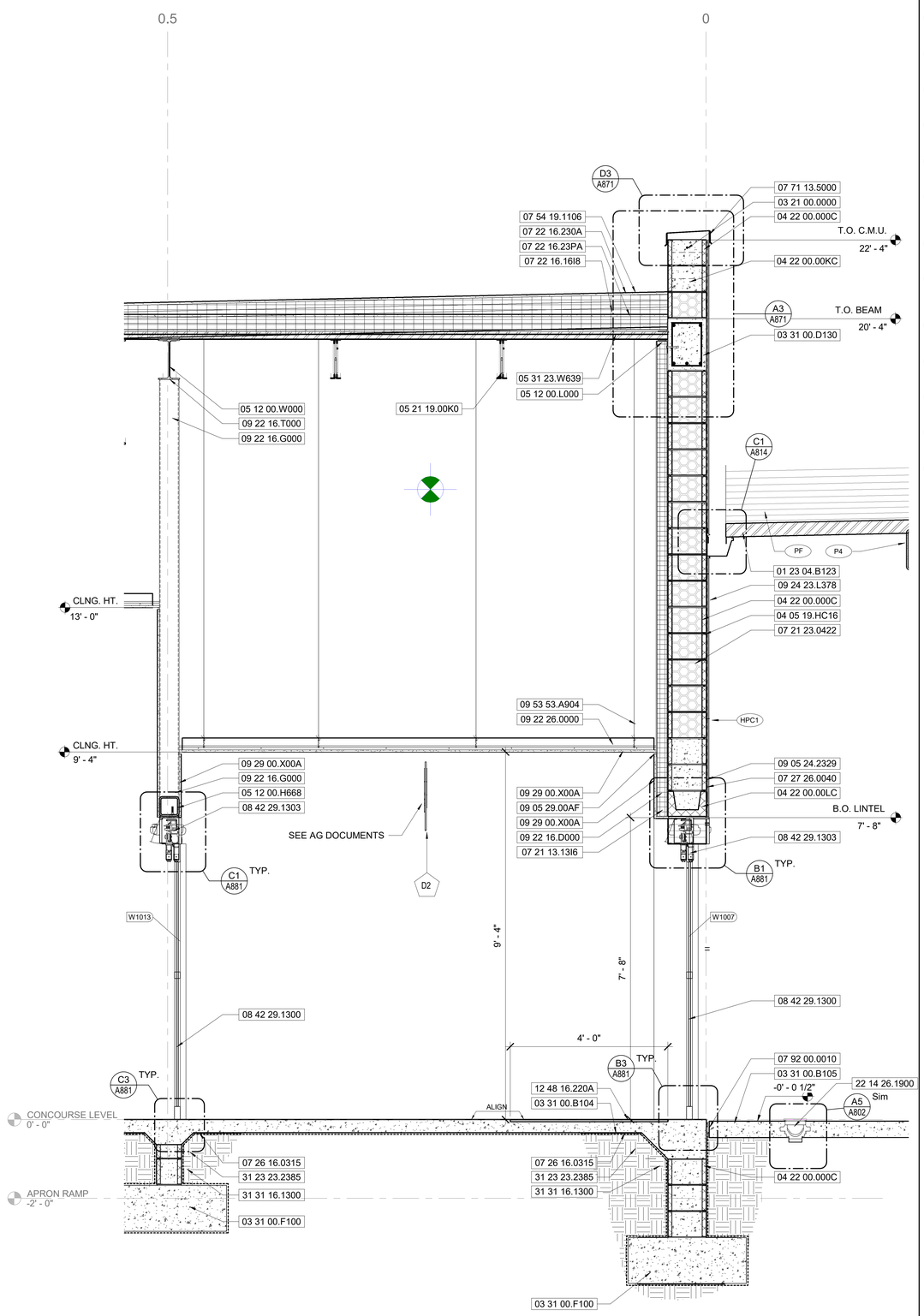


A1 WALL SECTION

3/4" = 1'-0"



A2 WALL SECTION

3/4" = 1'-0"

KEYNOTES

NO.	
01 23 04.B123	TYP. ALTERNATE 4 CANOPY CONTRUCTION WORK.
03 21 00.0000	TYP. CONCRETE REINFORCING STEEL BAR(S), SEE STRUCTURAL.
03 31 00.B104	TYP. 4" STRUCTURAL SLAB-ON-GRADE, SEE STRUCTURAL.
03 31 00.B105	TYP. 5" CONCRETE FLOOR SLAB, SEE STRUCTURAL
03 31 00.D000	TYP. CONCRETE CAST-IN-PLACE BEAM, SEE STRUCTURAL
03 31 00.D130	TYP. 12" X 16" CAST-IN-PLACE BEAM, SEE STRUCTURAL
03 31 00.F100	TYP. CONTINOUS WALL FOUNDATION, SEE STRUCTURAL.
04 05 19.HC16	TYP. MASONRY HORIZONTAL GALVANIZED WIRE REINFORCING @ 16" O.C. MAX
04 22 00.000C	TYP. 12" NOMINAL CONCRETE MASONRY UNIT
04 22 00.00KC	TYP. 12" NOMINAL GROUT FILLED CONCRETE MASONRY KNOCK-OUT UNIT.
04 22 00.00LC	TYP. 12" NOM. LINTEL CONCRETE MASONRY UNIT.
04 22 00.0008	TYP. 8" NOMINAL CONCRETE MASONRY UNIT.
05 12 00.H668	TYP. HSS 6X6X1/2 STRUCTURAL STEEL FRAMING, SEE STRUCTURAL.
05 12 00.L000	TYP. STEEL ANGLE 'L' SHAPE MEMBER, SEE STRUCTURAL.
05 12 00.W000	TYP. STEEL WIDE FLANGE 'W' SHAPE MEMBER, SEE STRUCTURAL.

KEYNOTES

NO.	
05 21 19.00K0	TYP. K SERIES OPEN WEB STEEL JOIST, SEE STRUCTURAL.
05 31 23.W639	TYP. 1-1/2" WR 20 GA. G90 STEEL ROOF DECK, SEE STRUCTURAL.
07 21 13.13I6	TYP. 3" THICK, POLYISOCYANURATE RIGID FOAM BOARD INSULATION.
07 21 23.0422	TYP. FILL ALL UN-GROUTED CELLS WITH INJECTED FOAM FILL INSULATION.
07 22 16.16I8	TYP. 4" MIN. POLYISOCYANURATE RIGID FOAM ROOF BOARD INSULATION.
07 22 16.23PA	TYP. 5/8" PRIMED DENS DECK ROOF INSULATION COVER BOARD.
07 22 16.230A	TYP. 5/8" DENS DECK ROOF INSULATION COVER BOARD.
07 26 16.0315	TYP. 15 MIL BELOW GRADE VAPOR BARRIER.
07 27 26.0040	TYP. 40 MILL THICK FLUID-APPLIED MEMBRANE VAPOR RETARDING AIR BARRIER.
07 54 19.1106	TYP. COLD ADHESIVE APPLIED, 60 MIL PVC MEMBRAINE ROOFING.
07 71 13.5000	TYP. ALUMNINUM MANUFACTURED COPING SYSTEM, INSTALLED PER MNFR. INSTRUCTIONS.
07 92 00.0010	TYP. JOINT SEALANT, CONT.
08 42 29.1300	TYP. ALUMINUM FRAMED AUTOMATIC ENTRANCE DOOR.
08 42 29.1303	TYP. ALUMINUM FRAMED AUTOMATIC ENTRANCE HEADER.
09 05 24.2329	TYP. PAPER BACKED SELF FURRING GALV. LATH.
09 05 29.00AF	TYP. ALUMINUM GYPSUM BOARD 'F' REVEAL ACCESSORY.
09 22 16.D000	TYPICAL 3 5/8" GALV. METAL STUD FRAMING @ 24" OC UNO.
09 22 16.G000	TYPICAL 6" GALV. METAL STUD FRAMING @16" OC UNO.
09 22 16.T000	TYPICAL GALV. METAL TRACK RUNNER CONT.
09 22 26.0000	TYP. GYPSUM ASSEMBLY SUSPENSION SYSTEM, INSTALL PER MNFR. INSTRUCTIONS.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
09 29 00.X00A	TYPICAL 5/8" TYPE 'X' GYPSUM WALL BOARD
09 53 53.A904	TYPICAL 9 GAUGE GALV. METAL HANGER WIRE @ 48" O.C. EACH WAY
12 48 16.220A	TYP. 5/8" SS 304 WALKOFF ENTRY MAT.
22 14 26.1900	TYP. FACILITY STORM TRENCH DRAIN, SEE PLUMBING.
31 23 23.2385	TYP. COMPACTED FILL TO A MIN. OF 85% COMPACTION AS PER ASTM D1557.
31 31 16.1300	TYP. SPRAY TERMITE TOXICANT BARRIER.

NOTES

1. REFER TO **A** SERIES SHEETS FOR PARTITION MARKERS AND **AL641** FOR PARTITION TYPES
2. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE.
   1t
3. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET **A711**
   101
4. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
5. ELEVATION MARKERS ARE ESTABLISHED AT CONCOURSE = 0' - 0"
6. RAILING CONSTRUCTION AND TYPES REFER TO SHEET **A865**
   1t
7. MATERIAL FINISH CODES, SEE **AF712** FIR DEFINITIONS.
   ?
8. AREA DESIGNATED FOR FUTURE WORK (NIC). CONTRACTOR SHALL KEEP THIS AREA CLEAR OF ANY BUILT ELEMENTS ABOVE AND/OR BELOW GROUND UNLESS OTHERWISE NOTED WITHIN THE SCOPE OF THIS PROJECT.
9. CONCESSION AREAS SHALL BE FIT OUT AS SHELL SPACES WITH CODE MINIMUM SYSTEMS SUPPORT AS INDICATED.

SCALE: 3/4" = 1'-0"

0 4" 8" 16" 32"

C19-2811- AP
Construction of Satellite Concourse 'C'

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AA-C002208
ULM 30B-F TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	**MLM-19672**
Designed By:	**MLM, MAM**
Drawn By:	**ST, CC, DM, CB**
Checked By:	**MAM**
Issue Date:	**30-NOV-2020**
Drawing Scale:	**As indicated**

Drawing Title:

ENLARGED WALL SECTIONS

BID DOCUMENTS

Drawing No.:

A624

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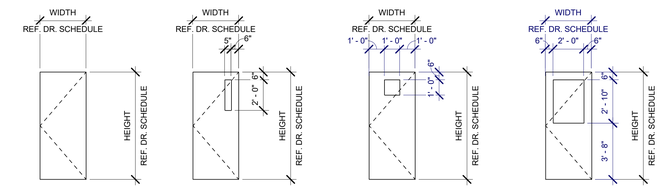
DOOR SCHEDULE

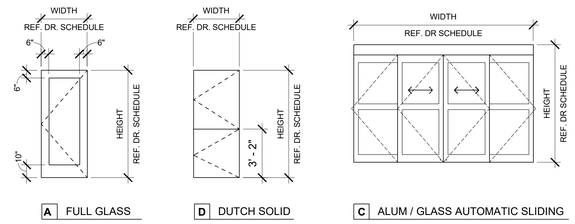
REV #	MARK	ROOM NO	DOOR TYPE	DOOR NUMBER OF LEAFS	DOOR SIZE WIDTH	DOOR SIZE HEIGHT	DOOR SIZE THICKNESS	DOOR MATERIAL	DOOR FIRE RATING	FRAME TYPE	FRAME DETAIL	FRAME MATERIAL	THRESHOLD DETAIL	THRESHOLD MATERIAL	COMMENTS	HARWARE SET
	W1251B	W1251	DD		3' - 7"	8' - 5"	2 1/8"									9
00_ Base Bid																
No	W1001B	W1001	F	1	3' - 8"	7' - 8"	1 3/4"	HM	NONE	ii	B4/B5	HM		ALUM		7
No	W1003	W1003	F	1	3' - 8"	7' - 10"	1 3/4"	HM	NONE	i	D4/D5 SIM.	HM		ALUM		3
No	W1004	W1004	F	1	3' - 8"	7' - 8"	1 3/4"	HM	NONE	ii	B4/B5	HM		ALUM		8
No	W1005	W1005	C	4	13' - 8 1/2"	7' - 0"	1 3/4"	ALUM	None	iii	B1/B2	ALUM		ALUM		1
No	W1006	W1006	F	1	3' - 8"	7' - 10"	1 3/4"	HM	NONE	i	D4/D5 SIM.	HM		ALUM		6
No	W1007	W1007	C	4	13' - 8 1/2"	7' - 0"	1 3/4"	ALUM	None	iii	B1/B2	ALUM		ALUM		1
No	W1011	W1011	C	4	13' - 8 1/2"	7' - 0"	1 3/4"	ALUM	None	iii	C1/C2	ALUM		ALUM		1
No	W1013	W1013	C	4	13' - 8 1/2"	7' - 0"	1 3/4"	ALUM	None	iii	C1/C2	ALUM		ALUM		1
No	W1018	W1018	F	1	3' - 8"	7' - 10"	1 3/4"	HM	90 min	i	D4/D5 SIM.	HM		ALUM		6
No	W1051	W1051	F	1	3' - 8"	7' - 8"	1 3/4"	HM	NONE	ii	B4/B5	HM		ALUM		9
No	W1061	W1061	F	1	3' - 8"	7' - 10"	1 3/4"	HM	NONE	i	D4/D5	HM		ALUM		6
No	W1062	W1062	F	1	3' - 8"	7' - 10"	1 3/4"	HM	NONE	i	D4/D5	HM		ALUM		5
No	W1063	W1063	F	1	3' - 8"	7' - 10"	1 3/4"	HM	NONE	i	D4/D5	HM		ALUM		6
No	W1064	W1064	F	1	3' - 8"	7' - 10"	1 3/4"	HM	NONE	i	D4/D5	HM		ALUM		4
No	W1072	W1072	F	1	4' - 0"	7' - 10"	1 3/4"	HM	45 min	i	B4/B5	HM		ALUM		10
No	W1081	W1081	F	1	3' - 8"	7' - 10"	1 3/4"	HM	NONE	i	D4/D5	HM		ALUM		5
No	W1114	W1114	F	1	4' - 0"	7' - 10"	1 3/4"	HM	45 min	i	B4/B5	HM		ALUM		10
No	W1276	W1276	F	1	3' - 8"	7' - 8"	1 3/4"	HM	NONE	ii	E4/E5	HM		ALUM		5
No	W1277	W1277	F	1	3' - 8"	7' - 8"	1 3/4"	HM	NONE	ii	B4/B5	HM		ALUM		8
No	W1278	W1278	F	1	3' - 8"	7' - 8"	1 3/4"	HM	NONE	ii	B4/B5	HM		ALUM		8
No	W1279	W1279	F	1	3' - 8"	7' - 10"	1 3/4"	HM	NONE	i	D4/D5	HM		ALUM		6
No	W1282	W1282	F	1	3' - 8"	7' - 10"	1 3/4"	HM	NONE	i	D4/D5	HM		ALUM		6
No	W1283	W1283	F	1	3' - 8"	7' - 8"	1 3/4"	HM	NONE	ii	E4/E5	HM		ALUM		3
No	W1285	W1285	F	1	3' - 8"	7' - 10"	1 3/4"	HM	NONE	i	D4/D5	HM		ALUM		3
01_ Alternate 1																
No	W1121	W1121	F	1	3' - 8"	7' - 8"	1 3/4"	HM	NONE	ii	B4/B5	HM		ALUM		9
No	W1141	W1141	F	1	4' - 0"	7' - 10"	1 3/4"	HM	45 min	i	B4/B5	HM		ALUM		10
No	W1151	W1151	F	1	3' - 8"	7' - 8"	1 3/4"	HM	NONE	ii	B4/B5	HM		ALUM		9
02_ Alternate 2																
No	W1183	W1183	F	1	4' - 0"	7' - 10"	1 3/4"	HM	45 min	i	B4/B5	HM		ALUM		10
No	W1201	W1201	F	1	3' - 8"	7' - 8"	1 3/4"	HM	NONE	ii	B4/B5	HM		ALUM		9
No	W1266	W1266	F	1	3' - 8"	7' - 8"	1 3/4"	HM	NONE	ii	B4/B5	HM		ALUM		8
No	W1267	W1267	F	1	3' - 8"	7' - 8"	1 3/4"	HM	NONE	ii	B4/B5	HM		ALUM		8
No	W1268	W1268	F	1	3' - 8"	7' - 10"	1 3/4"	HM	NONE	i	D4/D5	HM		ALUM		6
No	W1270	W1270	F	1	3' - 8"	7' - 10"	1 3/4"	HM	NONE	i	D4/D5	HM		ALUM		6
No	W1271	W1271	F	1	3' - 8"	7' - 8"	1 3/4"	HM	NONE	ii	E4/E5	HM		ALUM		3
No	W1273	W1273	F	1	3' - 8"	7' - 10"	1 3/4"	HM	NONE	i	D4/D5	HM		ALUM		3
03_ Alternate 3																
No	W1231	W1231	F	1	4' - 0"	7' - 10"	1 3/4"	HM	45 min	i	B4/B5	HM		ALUM		10
No	W1231B	W1231	FF	2	3' - 10"	7' - 8"	1 3/4"	HM	NONE	ii	B4/B5	HM		ALUM	1	12
No	W1232	W1232	F	1	3' - 8"	7' - 8"	1 3/4"	HM	NONE	ii	B4/B5	HM		ALUM		9
No	W1251A	W1251	F	1	4' - 0"	7' - 10"	1 3/4"	HM	45 min	i	B4/B5	HM		ALUM	2	11

NOTICE:
SCHEDULE(S) REVISED
WHEN THIS AREA IS CLOUDED

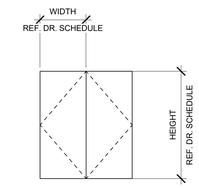
DOOR TYPES



F SOLID
N NARROW GLASS
V VISION PANEL
G HALF GLASS

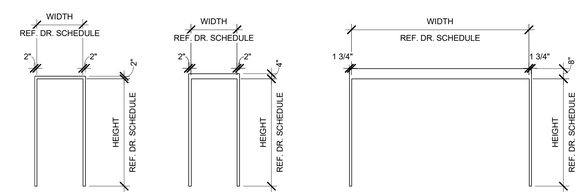


A FULL GLASS
D DUTCH SOLID
C ALUM / GLASS AUTOMATIC SLIDING



FF SOLID

FRAME TYPES



i HM FRAME
ii HM FRAME
iii ENTRANCE FRAME

GENERAL NOTES

1. SEE SPECIFICATION SECTION 08 71 00 FOR HARDWARE GROUPS, SECTION 08 8000 FOR GLASS TYPE OF DOORS & WINDOWS.
2. REFERENCE FINISH SCHEDULE FOR ADDITIONAL DOOR & FRAME FINISH INFORMATION.
3. SEE PARTITION SCHEDULE FOR DEPTH OF ALL DOORS & WINDOWS IN GYP. BOARD WALLS.
4. RIGHT HAND DOOR SHALL BE ACTIVE LEAF FOR DOUBLE DOORS.
5. EXTERIOR DOORS - MAXIMUM EFFORT TO OPERATE DOORS SHALL NOT EXCEED 5 LBS.
6. INTERIOR DOORS - MAXIMUM EFFORT TO OPERATE DOORS SHALL NOT EXCEED 5 LBS.
7. MAXIMUM EFFORT TO OPERATE DOOR SHALL NOT EXCEED 15 LBS. FOR INTERIOR AND EXTERIOR FIRE DOORS.
8. TYPICAL JAMB DIMENSIONS TO ADJACENT PARTITIONS ON HINGE SIDE OF DOOR OPENINGS: 8" AT CMU & 4" AT STUD PARTITIONS U.O.N.
9. ALL WOOD DOORS ARE TO BE UNDERCUT AS REQUIRED FOR FLOOR FINISHES & SPECIFICATIONS.
10. WIDTH / HEIGHT DIMENSIONS ARE LEAF OPENING SIZE
11. FOR DOORS IN MASONRY CONDITIONS, PROVIDE DOOR FRAME WITH 4" HEAD WIDTH FOR TOP OF FRAME.
12. FINISH AT MASONRY COURSING, WHERE OCCURS. CONTRACTOR TO VERIFY IN FIELD AND COORDINATE ALL LOCATIONS.
13. ALL DETAILS MARKED IN SCHEDULE: SEE SHEET: A881

SCHEDULE COMMENTS

1. ACS For Ramp Side Deliverys Delayed Egress
2. ALWAYES UNLUCKED FROM 1251

SUBMITTAL

EXTERIOR DOORS--(FOR EACH TYPE AND SIZE INSTALLED)--PROVIDE ONE OF THE FOLLOWING (TO INCLUDE COVER PAGE AND INSTALLATION DETAILS): FLORIDA PRODUCT APPROVAL, MIAMI DADE NOA, OR (ICC-ES) NER. DOCUMENTS ARE TO BE PROVIDED BY THE SAME ROUTING METHOD AS DRAWINGS WERE SUBMITTED TO GROWTH MANAGEMENT. THIS IS TO BE SUBMITTED BEFORE A FRAMING INSPECTION. BUILDER WILL NOT BE ABLE TO SCHEDULE A FRAMING INSPECTION UNTIL A RESPONSE IS APPROVED. 2017 FBC 104.9, 107.2.1; FLORIDA ADMINISTRATIVE CODE 9B-72.005

MATERIAL LEGEND

GLASS TYPES:

1 = 1/4" 20 MIN. RATED CLEAR TEMPERED GLASS
2 = 1/4" CLEAR TEMPERED GLASS
3 = 1 7/16" 90 MIN. RATED LAMINATED GLASS
(NOTE: ALL GLASS IN DOORS, SIDELITES OR TRANSOMS TO BE SAFETY GLASS.)

MATERIALS:
ALUM = ALUMINUM
GL = GLASS
SS = STAINLESS STEEL
WD = WOOD
HM = HOLLOW METAL
WWM = WELDED WIRE MESH
DET = DETENTION DOOR

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
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ALM JOB # TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	NO SCALE

Drawing Title:

DOOR SCHEDULE

BID DOCUMENTS

Drawing No.:

A711

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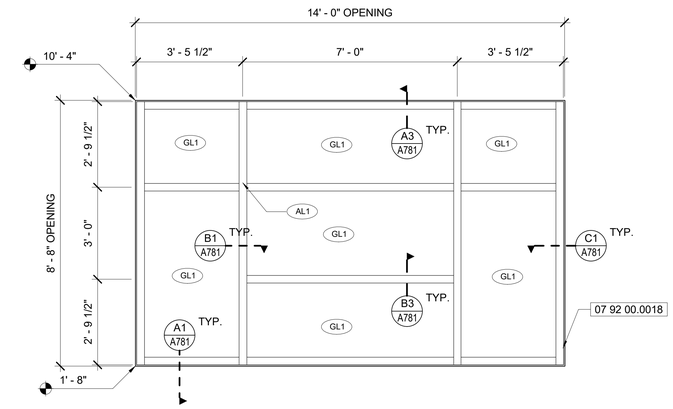
12/8/2020 5:47:04 PM



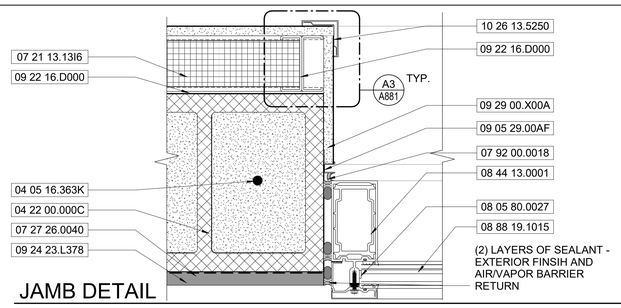
NOTE: ELEVATIONS PROVIDED ABOVE CONCOURSE LEVEL

TYP. 1/2" SEALANT JOINT FULL PERIMETER

SEE AF712 FOR GLAZING TYPE

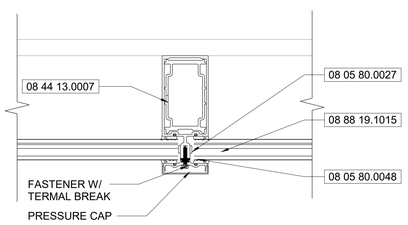
D4 WINDOW TYPE 'A' TYPICAL

1/2" = 1'-0"



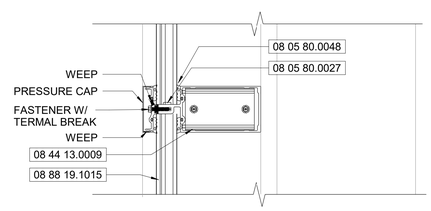
C1 JAMB DETAIL

3" = 1'-0"



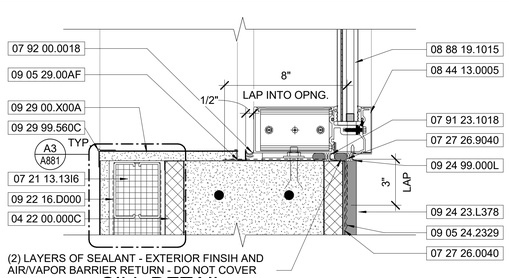
B1 VERTICAL MULLION DETAIL

3" = 1'-0"



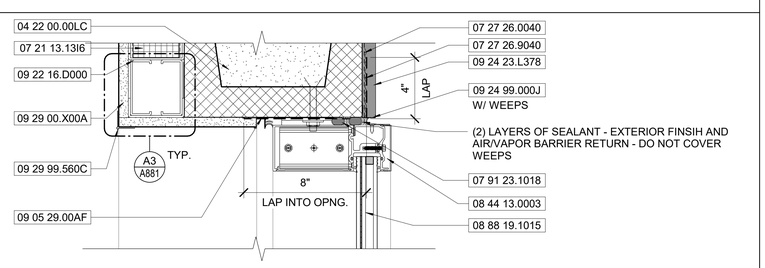
B3 HORIZONTAL MULLION DETAIL

3" = 1'-0"



A1 SILL DETAIL

3" = 1'-0"



A3 HEAD DETAIL

3" = 1'-0"

KEYNOTES

NO.	
04 05 16.363K	TYP. FILL CELL MASONRY W/ 3000 PSI GROUT.
04 22 00.000C	TYP. 12" NOMINAL CONCRETE MASONRY UNIT
04 22 00.00LC	TYP. 12" NOM. LINTEL CONCRETE MASONRY UNIT.
07 21 13.13I6	TYP. 3" THICK, POLYISOCYANURATE RIGID FOAM BOARD INSULATION.
07 27 26.0040	TYP. 40 MILL THICK FLUID-APPLIED MEMBRANE VAPOR RETARDING AIR BARRIER.
07 27 26.9040	TYP. 40 MILL THICK FLUID-APPLIED MEMBRANE VAPOR RETARDING AIR BARRIER JOINT REINFORCEMENT SELF ADHEARING SHEET.
07 91 23.1018	TYP. 1/2" BACKER ROD WITH JOINT SEALANT, CONT.
07 92 00.0018	TYP. 1/2" JOINT SEALANT, CONT.
08 05 80.0027	TYP. GLAZING BUTYL TAPE, PER MNFR.
08 05 80.0048	TYP. GLAZING RUBBERIZED GASKETING, PER MNFR.
08 44 13.0001	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY - JAMB EXTRUSION.
08 44 13.0003	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY - HEADER EXTRUSION.
08 44 13.0005	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY - SILL EXTRUSION WITH MNFR. FLASHING CLIP.
08 44 13.0007	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY - VERT. MULLION EXTRUSION WITH INTERNAL STEEL SUPPORT UN-INTURRUPTED SILL TO HEADER.
08 44 13.0009	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY - HORIZONTAL MULLION EXTRUSION WITH CLIPS @VERT.
08 88 19.1015	TYP. 1-5/16" HURRICANE-RESISTANT INSULATED GLAZING UNIT.
09 05 24.2329	TYP. PAPER BACKED SELF FURRING GALV. LATH.
09 05 29.00AF	TYP. ALUMINUM GYPSUM BOARD 'F' REVEAL ACCESSORY.
09 22 16.D000	TYPICAL 3 5/8" GALV. METAL STUD FRAMING @ 24" OC UNO.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
09 24 99.000J	TYP. CEMENT PLASTERING 'J' TRIM ACESSORY.
09 24 99.000L	TYP. CEMENT PLASTERING 'L' TRIM ACESSORY.
09 29 00.X00A	TYPICAL 5/8" TYPE 'X' GYPSUM WALL BOARD
09 29 99.560C	TYP. GALV. GWB ASSEMBLY CORNER BEAD TRIM ACCESSORY.
10 26 13.5250	TYP. 2" BRUSHED ALUMINUM WALL CORNER GUARD.

SCALE: 3" = 1'-0"
0 1" 2" 4" 8"

SCALE: 1/2" = 1'-0"
0 6" 12" 24" 48"

C19-2811- AP
Construction of Satellite Concourse 'C'

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ALM JOB # TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

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Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	AS NOTED

Drawing Title:

CURTAIN WALL TYPE 'A'

BID DOCUMENTS

Drawing No.:

A781

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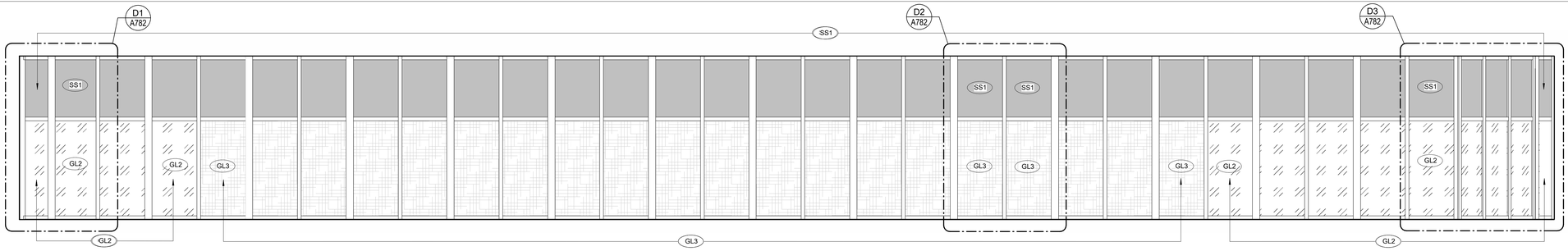
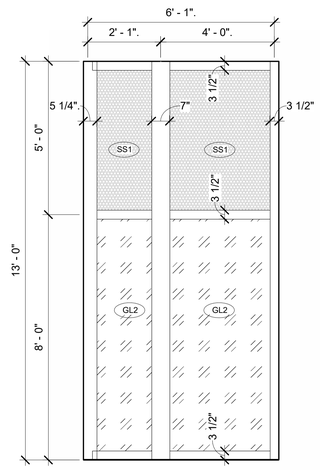


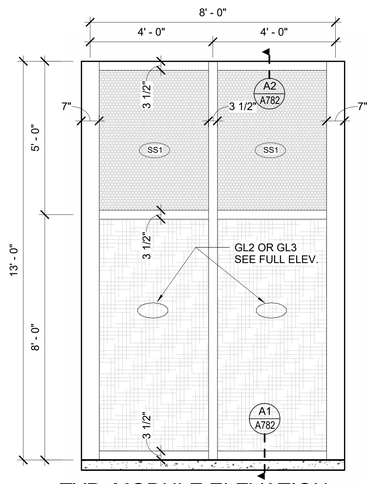
E1 PARTITION TYPE 'B' ELEVATION

1/4" = 1'-0"



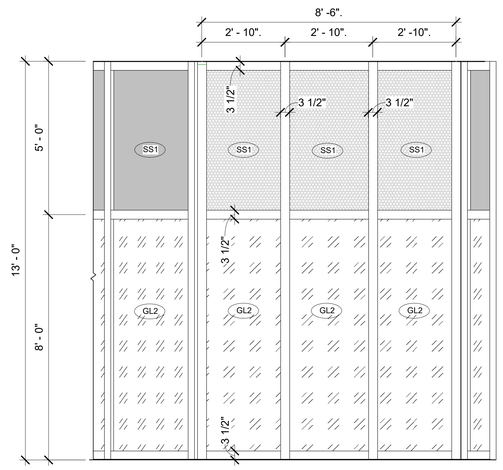
D1 END WALL ELEVATION

1/2" = 1'-0"



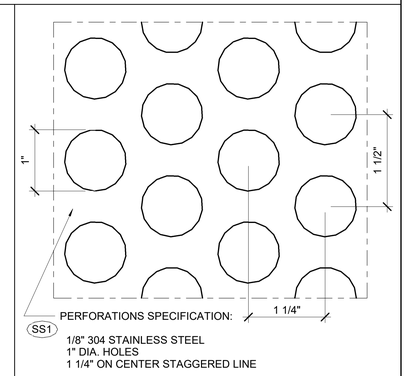
D2 TYP. MODULE ELEVATION

1/2" = 1'-0"



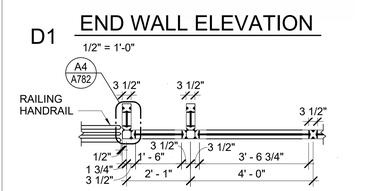
D3 45° ANGLE ELEVATION

1/2" = 1'-0"



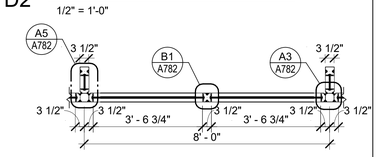
D5 PERFORATION SPECIFICATION

12" = 1'-0"



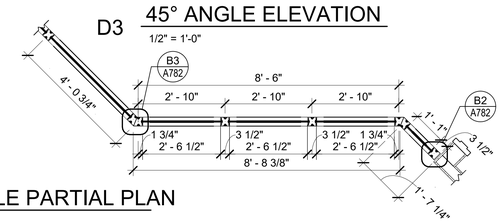
C1 END WALL PARTIAL PLAN

1/2" = 1'-0"



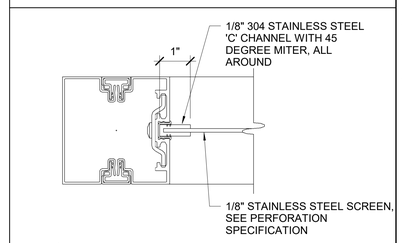
C2 TYP. MODULE PARTIAL PLAN

1/2" = 1'-0"



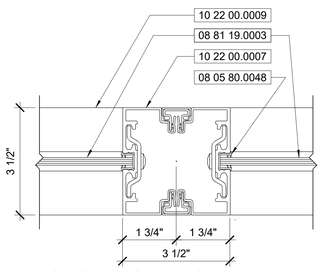
C3 45° ANGLE PARTIAL PLAN

1/2" = 1'-0"



C5 PARTITION S.S. TRIM

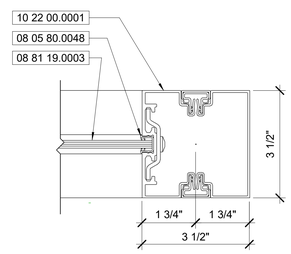
6" = 1'-0"



NOTE: SIMILAR CONDITION FOR HORZ. & VERTICAL

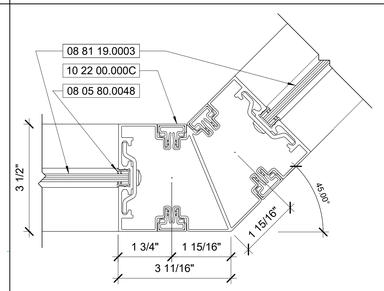
B1 IN-LINE MULLION DETAIL

6" = 1'-0"



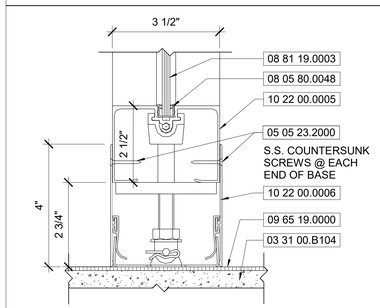
B2 END CAP MULLION DETAIL

6" = 1'-0"



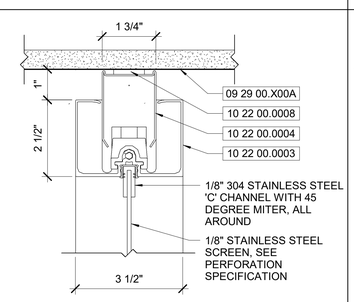
B3 45° MULLION DETAIL

6" = 1'-0"



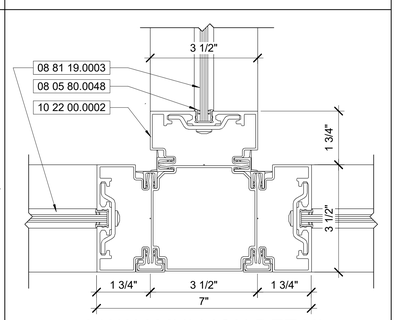
A1 PARTITION BASE DETAIL

6" = 1'-0"



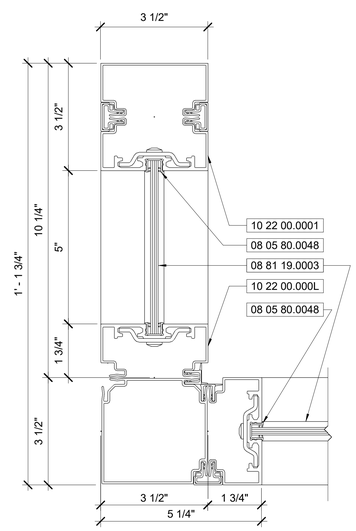
A2 PARTITION HEAD DETAIL

6" = 1'-0"



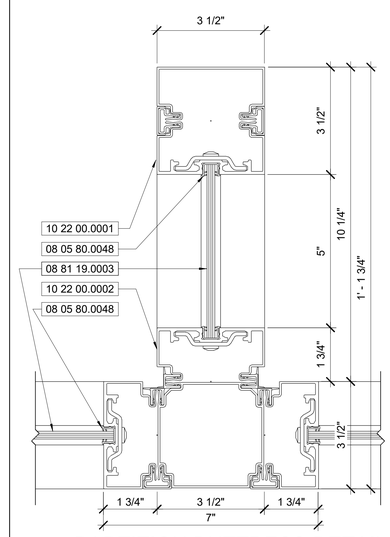
A3 3 WAY MULLION DETAIL

6" = 1'-0"



A4 PARTITION CORNER DETAIL

6" = 1'-0"



A5 PARTITION BUTTRESS DETAIL

6" = 1'-0"

KEYNOTES

NO.	
03 31 00.B104	TYP. 4" STRUCTURAL SLAB-ON-GRADE, SEE STRUCTURAL.
05 05 23.2000	TYP. STAINLESS STEEL FASTENER(S).
08 05 80.0048	TYP. GLAZING RUBBERIZED GASKETING, PER MNFR.
08 81 19.0003	TYP. 3/8" CLEAR TEMPERED GLAZING; SEE GLAZING TYPES FOR APPLIED FILM.
09 29 00.X00A	TYPICAL 5/8" TYPE 'X' GYPSUM WALL BOARD
09 65 19.0000	TYP. LUXARY VINYL COMPOSITION TILE, SEE SCHEDULE.
10 22 00.000C	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - 45 DEGREE CORNER EXTRUSION.
10 22 00.000L	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - 90 DEGREE CORNER EXTRUSION.
10 22 00.0001	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - END CAP EXTRUSION.
10 22 00.0002	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - "T" 3 WAY CONNECTION EXTRUSION.
10 22 00.0003	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - HEADER EXTRUSION.
10 22 00.0004	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - HEAD - RECESSED CEILING CHANNEL
10 22 00.0005	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - SILL EXTRUSION.
10 22 00.0006	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - SILL - ADJUSTABLE RECESS BASE.
10 22 00.0007	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - VERT. IN-LINE MULLION EXTRUSION UN-INTERRUPTED SILL TO HEADER.
10 22 00.0008	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - HEAD - RECESSED CEILING GASKET.
10 22 00.0009	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - HORIZONTAL IN-LINE MULLION EXTRUSION.

SCALE: 1/4" = 1'-0"
0 1' 2' 4' 8'

SCALE: 1/2" = 1'-0"
0 6" 12" 24" 48"

SCALE: 6" = 1'-0"
0 1/2"1" 2" 4"

SCALE: 12" = 1'-0"
0 1/4"1/2" 1" 2"

C19-2811- AP
Construction
of Satellite
Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
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MLM JOB # TYP. PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

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Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	AS NOTED

Drawing Title:

DEMOUNTABLE GLAZING WALL TYPE 'B'

BID DOCUMENTS

Drawing No.:

A782

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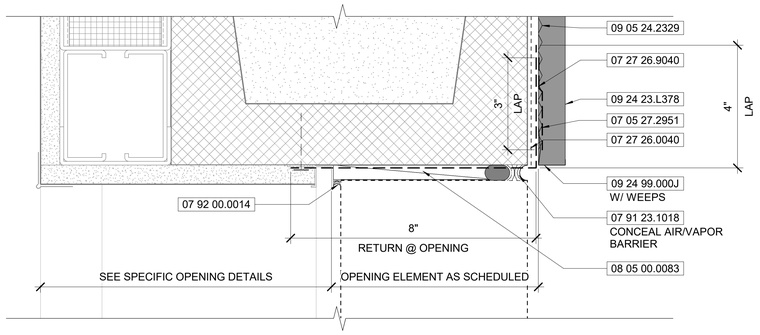
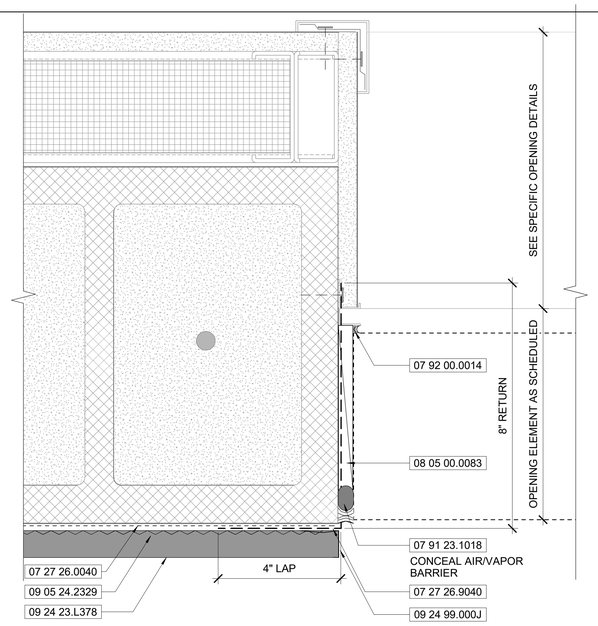


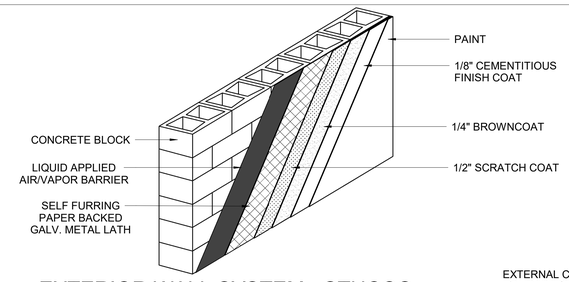
D2 AIR/VAPOR BARRIER @ HEAD DETAIL

6" = 1'-0"



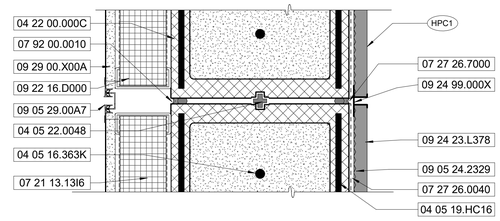
B2 AIR/VAPOR BARRIER @ JAMB DETAIL

6" = 1'-0"



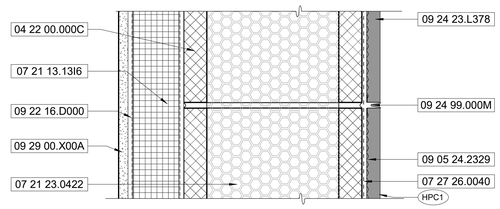
E4 EXTERIOR WALL SYSTEM - STUCCO

N.T.S.



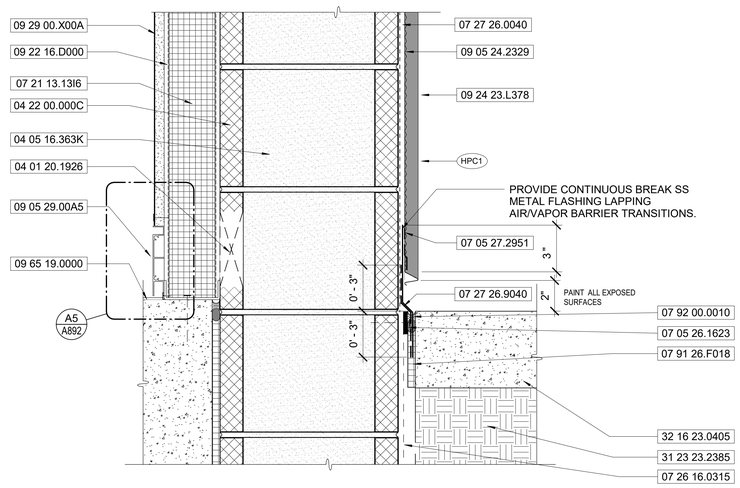
D4 TYPICAL CMU VERTICAL CONTROL JOINT DETAIL

3" = 1'-0"



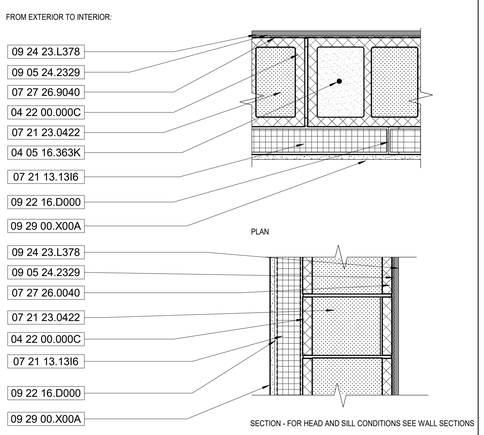
C4 TYPICAL STUCCO REVEAL DETAIL

3" = 1'-0"



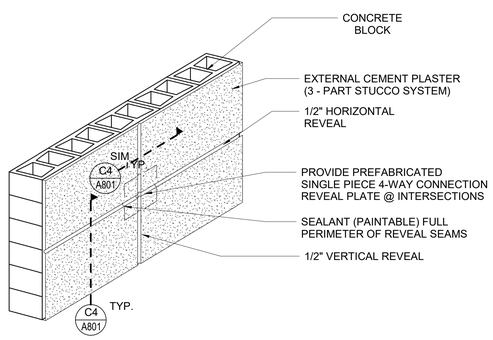
A4 STUCCO WEEP SCREED BASE DETAIL

3" = 1'-0"



A1 [EWS1] WALL SYSTEM

1 1/2" = 1'-0"



A2 REVEAL SYSTEM - STUCCO

N.T.S.

KEYNOTES

NO.	
04 01 20.1926	TYP. MASONRY REINFORCING INSPECTION OPENING @ EACH FILLED CELL, SEE STRUCTURAL
04 05 16.363K	TYP. FILL CELL MASONRY W/ 3000 PSI GROUT.
04 05 19.HC16	TYP. MASONRY HORIZONTAL GALVANIZED WIRE REINFORCING @ 16" O.C. MAX
04 05 22.0048	TYP. CMU SASH EXPANSION MATERIAL, SEE SPECIFICATIONS.
04 22 00.000C	TYP. 12" NOMINAL CONCRETE MASONRY UNIT
07 05 26.1623	TYP. BELOW GRADE VAPOR BARRIER TERMINATION BAR, FASTEN PER MNFR. INSTRUCTION.
07 05 27.2951	TYP. LAP 40 MILL THICK FLUID-APPLIED MEMBRANE VAPOR RETARDING AIR BARRIER JOINT ADHESIVE TAPE OVER STUCCO ACCESSORY AND BARRIER.
07 21 13.13I6	TYP. 3" THICK, POLYISOCYANURATE RIGID FOAM BOARD INSULATION.
07 21 23.0422	TYP. FILL ALL UN-GROUTED CELLS WITH INJECTED FOAM FILL INSULATION.
07 26 16.0315	TYP. 15 MIL BELOW GRADE VAPOR BARRIER.
07 27 26.0040	TYP. 40 MILL THICK FLUID-APPLIED MEMBRANE VAPOR RETARDING AIR BARRIER.
07 27 26.7000	FLUID APPLIED MEMBRANE VAPOR RETARDING AIR PARRIER COMPATABLE SEALANT.
07 27 26.9040	TYP. 40 MILL THICK FLUID-APPLIED MEMBRANE VAPOR RETARDING AIR BARRIER JOINT REINFORCEMENT SELF ADHEARING SHEET.
07 91 23.1018	TYP. 1/2" BACKER ROD WITH JOINT SEALANT, CONT.
07 91 26.F018	TYP. 1/2" MINIERAL FIBER JOINT FILLER CONT.
07 92 00.0010	TYP. JOINT SEALANT, CONT.
07 92 00.0014	TYP. 1/4" JOINT SEALANT, CONT.
08 05 00.0083	TYP. PT/FR SHIM AS REQUIRED.
09 05 24.2329	TYP. PAPER BACKED SELF FURRING GALV. LATH.
09 05 29.00A5	TYP. ALUMINUM GYPSUM BOARD REVEAL BASE ACCESSORY.
09 05 29.00A7	TYP. ALUMINUM GYPSUM BOARD 3 PIECE COMPRESSION EXPANSION REVEAL ACCESSORY.
09 22 16.D000	TYPICAL 3 5/8" GALV. METAL STUD FRAMING @ 24" OC UNO.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
09 24 99.000J	TYP. CEMENT PLASTERING 'J' TRIM ACESSORY.
09 24 99.000M	TYP. CEMENT PLASTERING 'M' REVEAL SCREED ACESSORY.
09 24 99.000X	TYP. CEMENT PLASTERING EXPANSIN CHANNEL W/ 1/2" REVEAL SCREED ACESSORY.
09 29 00.X00A	TYPICAL 5/8" TYPE 'X' GYPSUM WALL BOARD
09 65 19.0000	TYP. LUXARY VINYL COMPOSITION TILE, SEE SCHEDULE.
31 23 23.2385	TYP. COMPACTED FILL TO A MIN. OF 85% COMPACTION AS PER ASTM D1557.
32 16 23.0405	TYP. 4" BROOM FINISHED CONCRETE SIDEWALK.

SCALE: 3" = 1'-0"
0 1" 2" 4" 8"
SCALE: 6" = 1'-0"
0 1/2" 1" 2" 4"

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
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AA-C002208
ALM 308 & TYPE PROPERTY
MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	AS NOTED

Drawing Title:

EXTERIOR WALL DETAILS

BID DOCUMENTS

Drawing No.:

A801

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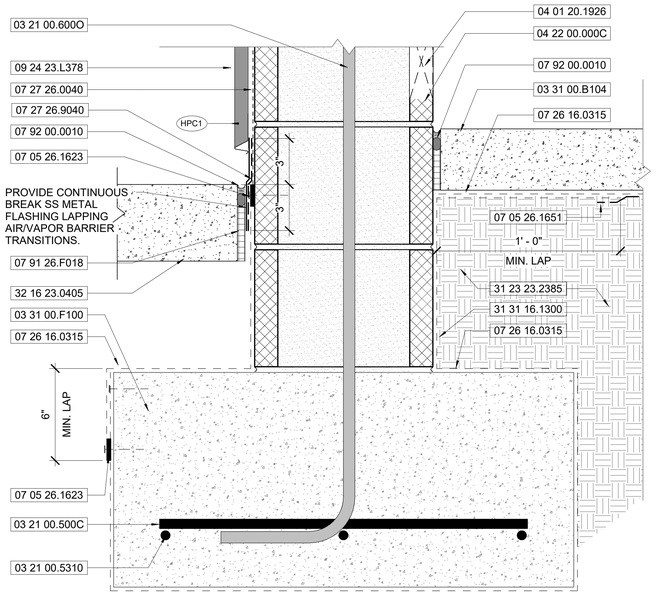

D1 TYP. VAPOR BARRIER INSTALLATION DETAIL

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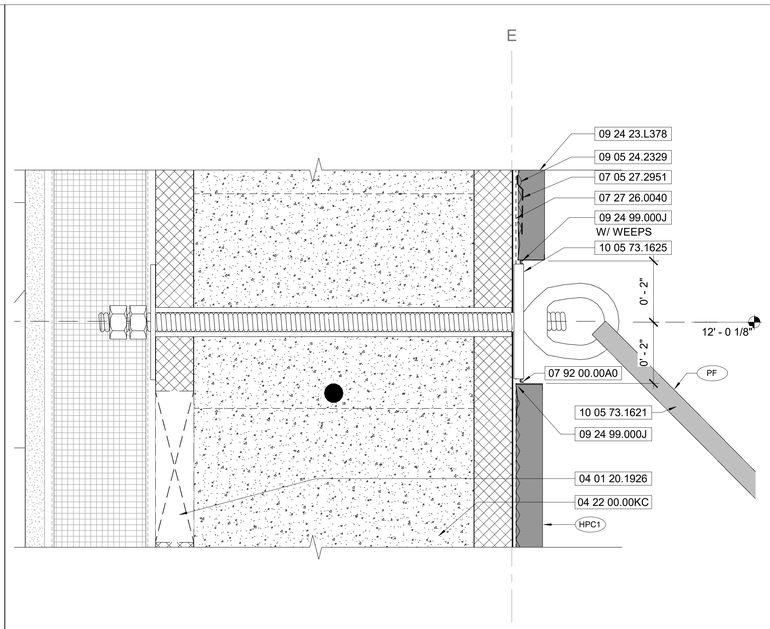
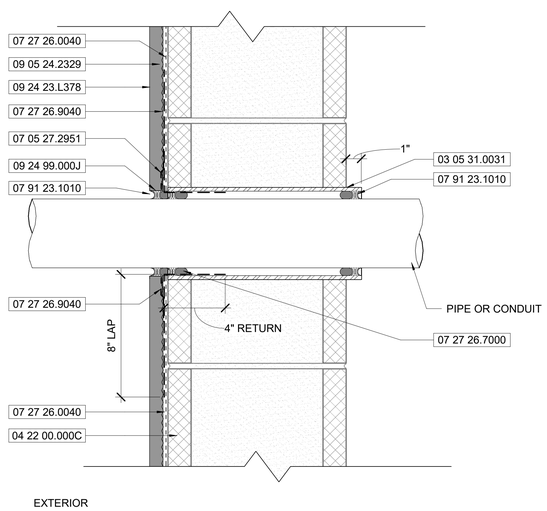


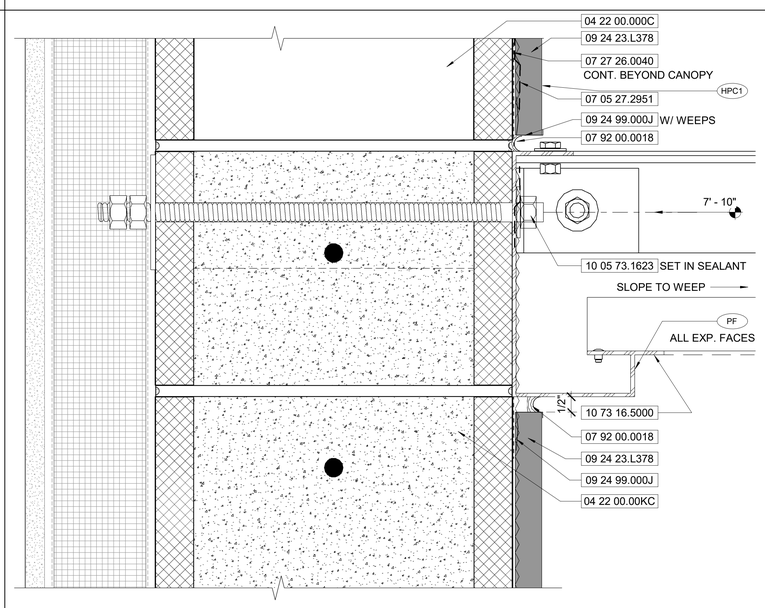
D3 TYPICAL UPPER CANOPY ATTACHMENT DETAIL

6" = 1'-0"



B1 PIPE PENETRATION @ ABOVE GRADE

3" = 1'-0"



B3 TYPICAL LOWER CANOPY ATTACHMENT DETAIL

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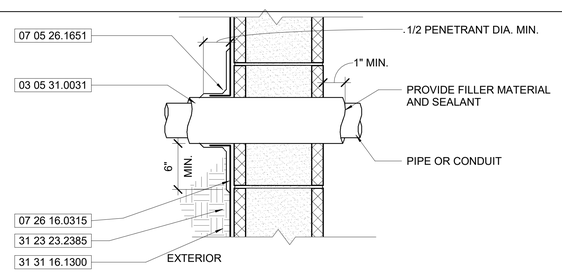
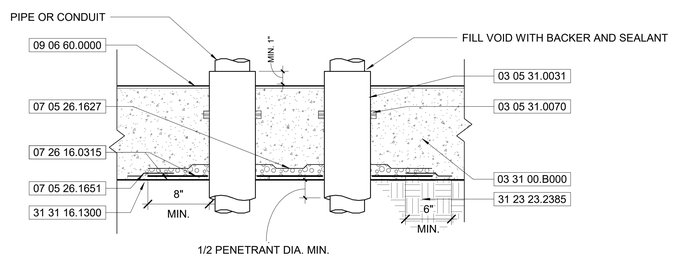


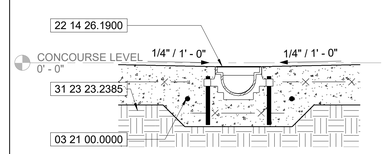
A1 PIPE PENETRATION @ SHALLOW FOUNDATION

1 1/2" = 1'-0"



A3 PIPE PENETRATIONS @ SHALLOW FOUNDATION & SOG

1 1/2" = 1'-0"



A5 TRENCH DRAIN

1 1/2" = 1'-0"

KEYNOTES

NO.	
03 05 31.0031	TYP. CAST SLEEVE FOR PENETRENTS.
03 05 31.0070	TYP. BUTYL TAPE AROUND SLEEVE.
03 21 00.0000	TYP. CONCRETE REINFORCING STEEL BAR(S), SEE STRUCTURAL.
03 21 00.500C	TYP. NO. 5 CONCRETE REINFORCEMENT BARS @ 12" OC, SEE STRUCTURAL.
03 21 00.600O	TYP. NO. 6 CONCRETE REINFORCEMENT BARS @ 24" OC, SEE STRUCTURAL.
03 21 00.5310	TYP. (3) NO. 5 CONCRETE REINFORCEMENT BARS CONT., SEE STRUCTURAL.
03 31 00.B000	TYP. STRUCTURAL CONCRETE FLOOR SLAB, SEE STRUCTURAL.
03 31 00.B104	TYP. 4" STRUCTURAL SLAB-ON-GRADE, SEE STRUCTURAL.
03 31 00.F100	TYP. CONTINOUS WALL FOUNDATION, SEE STRUCTURAL.
04 01 20.1926	TYP. MASONRY REINFORCING INSPECTION OPENING @ EACH FILLED CELL, SEE STRUCTURAL
04 22 00.000C	TYP. 12" NOMINAL CONCRETE MASONRY UNIT
04 22 00.00KC	TYP. 12" NOMINAL GROUT FILLED CONCRETE MASONRY KNOCK-OUT UNIT.
07 05 26.1623	TYP. BELOW GRADE VAPOR BARRIER TERMINATION BAR, FASTEN PER MNFR. INSTRUCTION.
07 05 26.1627	TYP. MASTIC SEALER FOR BELOW GRADE VAPOR BARRIER. USE MNFR. APPROVED MASTIC AND INSTALL AS INSTRUCTED.
07 05 26.1651	TYP. ADHESIVE JOINT TAPE FOR BELOW GRADE VAPOR BARRIER. USE MNFR. APPROVED TAPE AND INSTALL AS INSTRUCTED.
07 05 27.2951	TYP. LAP 40 MILL THICK FLUID-APPLIED MEMBRANE VAPOR RETARDING AIR BARRIER JOINT ADHESIVE TAPE OVER STUCCO ACCESSORY AND BARRIER.
07 26 16.0315	TYP. 15 MIL BELOW GRADE VAPOR BARRIER.
07 27 26.0040	TYP. 40 MILL THICK FLUID-APPLIED MEMBRANE VAPOR RETARDING AIR BARRIER.

KEYNOTES

NO.	
07 27 26.7000	FLUID APPLIED MEMBRANE VAPOR RETARDING AIR PARRIER COMPATABLE SEALANT.
07 27 26.9040	TYP. 40 MILL THICK FLUID-APPLIED MEMBRANE VAPOR RETARDING AIR BARRIER JOINT REINFORCEMENT SELF ADHEARING SHEET.
07 91 23.1010	TYP. BACKER ROD WITH JOINT SEALANT, CONT.
07 91 26.F018	TYP. 1/2" MINIERAL FIBER JOINT FILLER CONT.
07 92 00.00A0	TYP. JOINT SEALANT, FULL PERIMETER.
07 92 00.0010	TYP. JOINT SEALANT, CONT.
07 92 00.0018	TYP. 1/2" JOINT SEALANT, CONT.
09 05 24.2329	TYP. PAPER BACKED SELF FURRING GALV. LATH.
09 06 60.0000	TYP. FINISH FLOOR SEE ROOM FINISH SCHEDULE.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
09 24 99.000J	TYP. CEMENT PLASTERING 'J' TRIM ACESSORY.
10 05 73.1621	TYP. CANOPY SUPPORT TENSION ROD.
10 05 73.1623	TYP. THREADED ROD THROUGH BOLT W/ COMPRESSIVE SLEAVE & BACKPLATE FOR LOWER CONNECTION OF CANOPY.
10 05 73.1625	TYP. THREADED ROD THROUGH BOLT W/ COMPRESSIVE SLEAVE & BACKPLATE FOR UPPER CONNECTION OF CANOPY SYSTEM EYE BOLT. ATTACHMENT POINT MUST REMAIN IN VERTICLE POSITION.
10 73 16.5000	TYP. PREMANUFACTURED ALUMINUM CANOPY SYSTEM. PROVIDE SIGNED & SEALED CALCULATIONS/SHOPDRAWINGS COMPLYING W/ STRUCTURAL DESIGN LOADS.
22 14 26.1900	TYP. FACILITY STORM TRENCH DRAIN, SEE PLUMBING.
31 23 23.2385	TYP. COMPACTED FILL TO A MIN. OF 85% COMPACTION AS PER ASTM D1557.
31 31 16.1300	TYP. SPRAY TERMITE TOXICANT BARRIER.
32 16 23.0405	TYP. 4" BROOM FINISHED CONCRETE SIDEWALK.

SUBMITTAL

EXTERIOR CANOPY--(FOR EACH TYPE AND SIZE INSTALLED)--PROVIDE ONE OF THE FOLLOWING (TO INCLUDE COVER PAGE AND INSTALLATION DETAILS): FABRICATION DRAWINGS/ CALCULATIONS SIGNED & SEALED BY A FLORIDA REGISTERED ENGINEER OF RECORD, FLORIDA PRODUCT APPROVAL, MIAMI DADE NOA, OR (ICC-ES) NER. DOCUMENTS ARE TO BE PROVIDED BY THE SAME ROUTING METHOD AS DRAWINGS WERE SUBMITTED TO GROWTH MANAGEMENT. THIS IS TO BE SUBMITTED BEFORE A FRAMING INSPECTION. BUILDER WILL NOT BE ABLE TO SCHEDULE A FRAMING INSPECTION UNTIL A RESPONSE IS APPROVED. 2017 FBC 104.9, 107.2.1; FLORIDA ADMINISTRATIVE CODE 9B-72.005

SCALE: 1 1/2" = 1'-0"
0 2" 4" 8" 16"

SCALE: 3" = 1'-0"
0 1" 2" 4" 8"

SCALE: 6" = 1'-0"
0 1/2"1" 2" 4"

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE. SUITE 107
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407.894.1338 (FAX)
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AA-C002208
ULM 308-F TYPE PROPERTY
MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

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Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	AS NOTED

Drawing Title:

SECTION DETAILS

BID DOCUMENTS

Drawing No.:

A802

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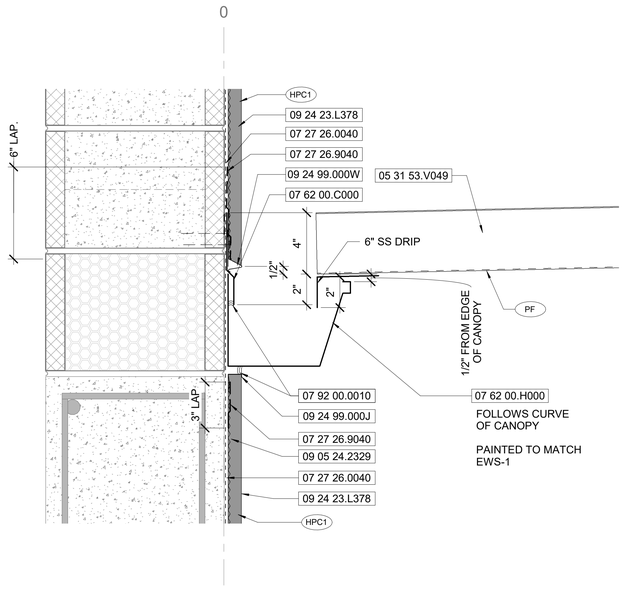
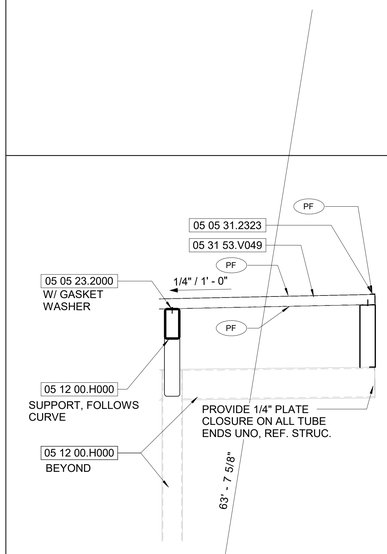


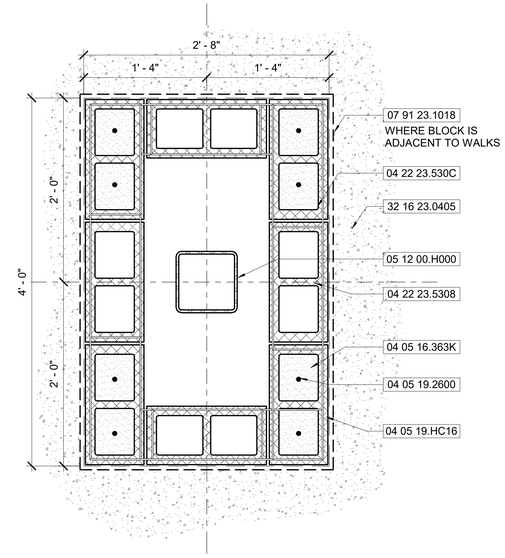
C1 GUTTER SECTION DETAIL

3" = 1'-0"



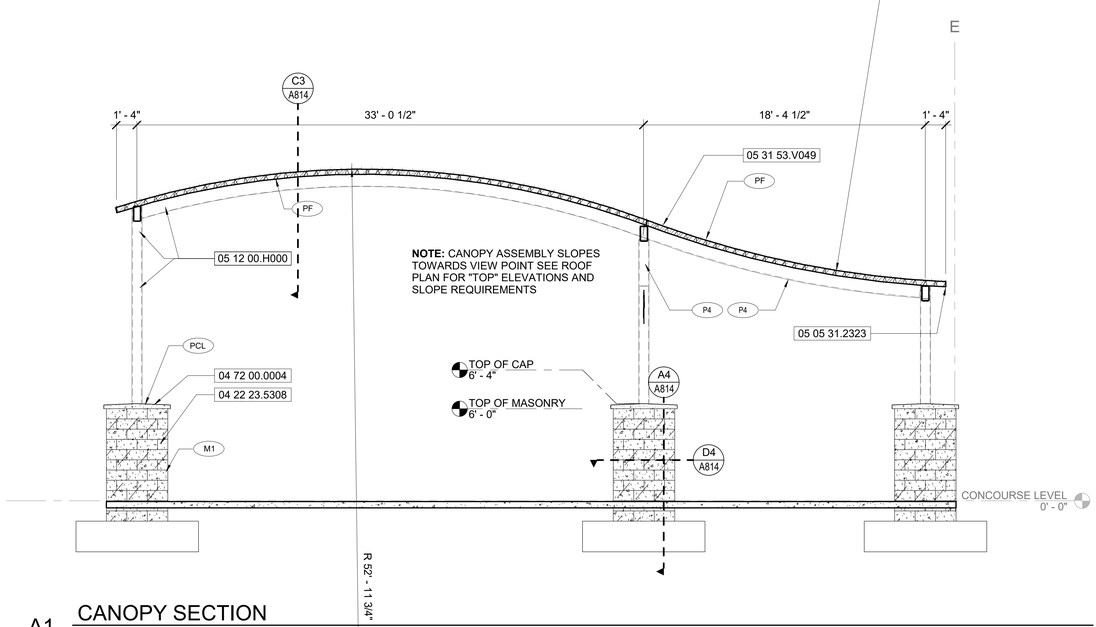
C3 HIGH END CLOSURE

1/2" = 1'-0"



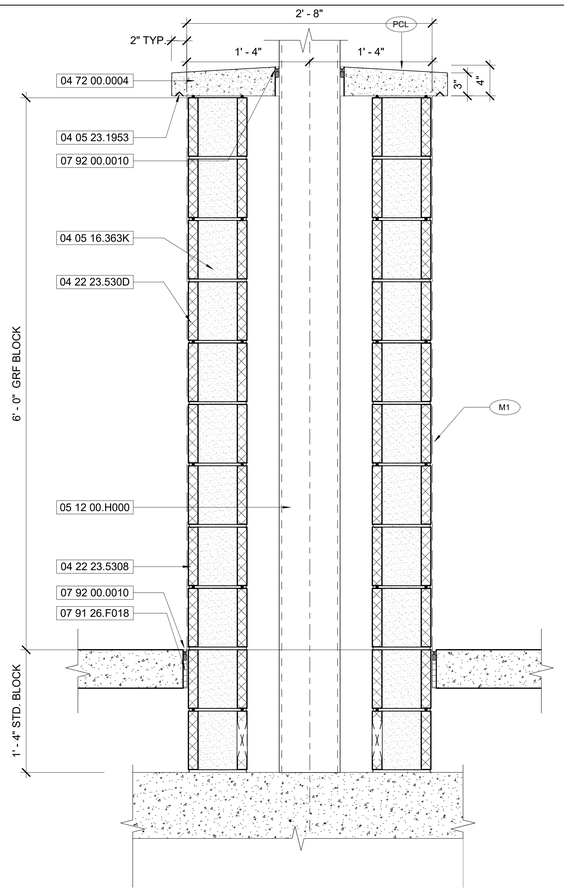
D4 PILASTER PLAN DETAIL

1 1/2" = 1'-0"



A1 CANOPY SECTION

1/4" = 1'-0"



A4 PILASTER SECTION DETAIL

1 1/2" = 1'-0"

KEYNOTES

NO.	
04 05 16.363K	TYP. FILL CELL MASONRY W/ 3000 PSI GROUT.
04 05 19.2600	TYP. MASONRY REINFORCING BARS, SEE STRUCTURAL
04 05 19.HC16	TYP. MASONRY HORIZONTAL GALVANIZED WIRE REINFORCING @ 16" O.C. MAX
04 05 23.1953	TYP. 1/4" 'V' GROVE CUT CONT. AROUND CAP STONE.
04 22 23.530C	TYP. BURNISHED CORNER CONCRETE MASONRY UNIT
04 22 23.530D	TYP. BURNISHED 2 FACE CONCRETE MASONRY UNIT
04 22 23.5308	TYP. 8" BURNISHED CONCRETE MASONRY UNIT
04 72 00.0004	TYP. CAST STONE CAP TO MATCH EXISTING, 4" TALL.
05 05 23.2000	TYP. STAINLESS STEEL FASTENER(S).
05 05 31.2323	TYP. ROOF DECK CLOSURE, REF. STRUC.
05 12 00.H000	TYP. HSS SHAPE STRUCTURAL STEEL FRAMING, SEE STRUCTURAL.
05 31 53.V049	TYP. 4" DOVETAIL G-90 GALV. STEEL ARCHITECTURALLY EXPOSED DECK. BASIS OF DESIGN: EPIC TORIS 4 - CANOPY.
07 27 26.0040	TYP. 40 MILL THICK FLUID-APPLIED MEMBRANE VAPOR RETARDING AIR BARRIER.
07 27 26.9040	TYP. 40 MILL THICK FLUID-APPLIED MEMBRANE VAPOR RETARDING AIR BARRIER JOINT REINFORCEMENT SELF ADHEARING SHEET.
07 62 00.C000	TYP. STAINLESS STEEL COUNTER-FLASHING.
07 62 00.H000	TYP. 8" X 6" BEVELED ALUMINUM GUTTER.
07 91 23.1018	TYP. 1/2" BACKER ROD WITH JOINT SEALANT, CONT.
07 91 26.F018	TYP. 1/2" MINIERAL FIBER JOINT FILLER CONT.
07 92 00.0010	TYP. JOINT SEALANT, CONT.
09 05 24.2329	TYP. PAPER BACKED SELF FURRING GALV. LATH.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
09 24 99.000J	TYP. CEMENT PLASTERING 'J' TRIM ACESSORY.
09 24 99.000W	TYP. CEMENT PLASTERING WEEP SCREED ACESSORY.
32 16 23.0405	TYP. 4" BROOM FINISHED CONCRETE SIDEWALK.

SCALE: 1/4" = 1'-0"
0 1' 2' 4' 8'

SCALE: 1/2" = 1'-0"
0 6" 12" 24" 48"

SCALE: 1 1/2" = 1'-0"
0 2" 4" 8" 16"

SCALE: 3" = 1'-0"
0 1" 2" 4" 8"

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Drawing Title:

ALTERNATE 4 CANOPY DETAILS

BID DOCUMENTS

Drawing No.:

A814

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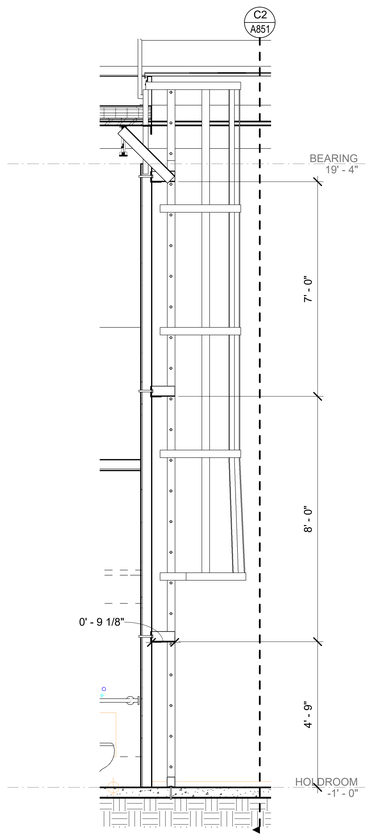
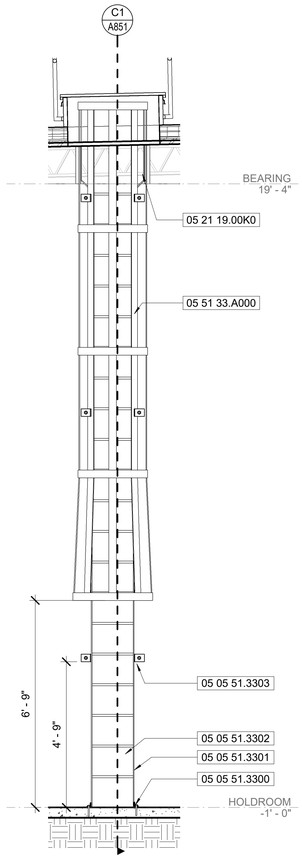


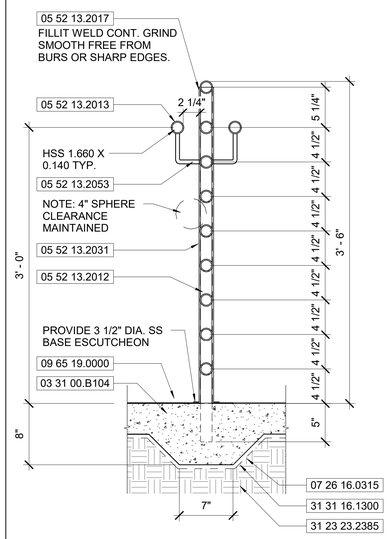
C1 ROOF ACCESS LADDER

1/2" = 1'-0"



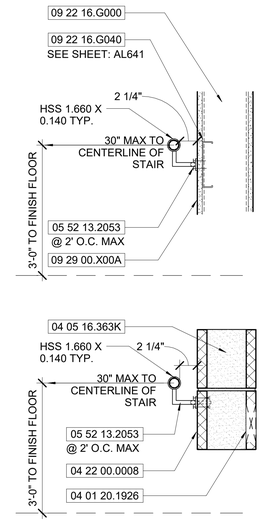
C2 ROOF ACCESS LADDER

1/2" = 1'-0"



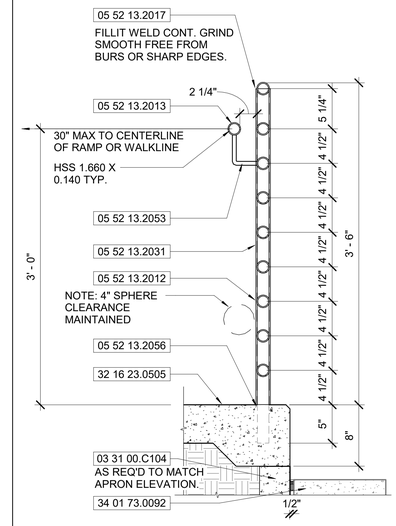
D3 R-03 HAND & GUARDRAIL

1 1/2" = 1'-0"



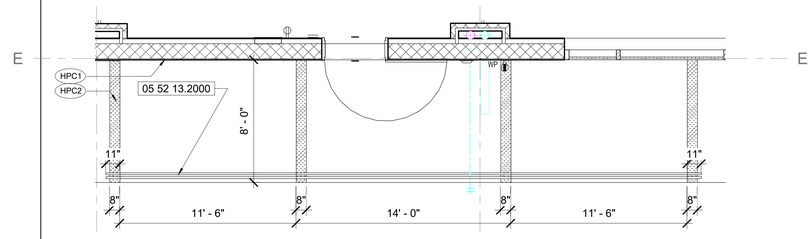
D4 R-02 HANDREL

1 1/2" = 1'-0"



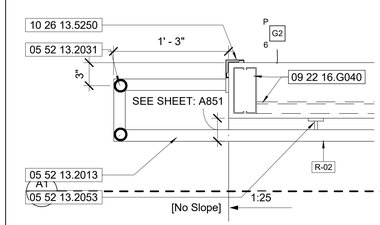
D5 R-01 HAND & GUARDRAIL

1 1/2" = 1'-0"



C3 RAMP PLAN

1/4" = 1'-0"



C5 PODIUM RAIL RETURN

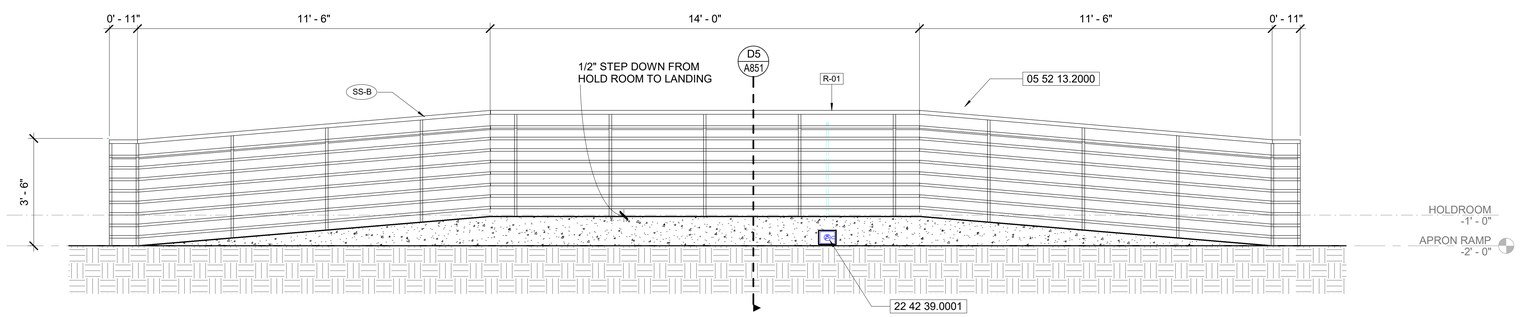
1 1/2" = 1'-0"

KEYNOTES

NO.	
03 31 00.B104	TYP. 4" STRUCTURAL SLAB-ON-GRADE, SEE STRUCTURAL.
03 31 00.C104	TYP. 4" STRUCTURAL CAST-IN-PLACE CONCRETE WALL, SEE STRUCTURAL
04 01 20.1926	TYP. MASONRY REINFORCING INSPECTION OPENING @ EACH FILLED CELL, SEE STRUCTURAL
04 05 16.363K	TYP. FILL CELL MASONRY W/ 3000 PSI GROUT.
04 22 00.0008	TYP. 8" NOMINAL CONCRETE MASONRY UNIT.
05 05 51.3300	TYP. STEEL ANGLE SUPPORT WELD CONT. @ STRINGER AND FLOOR ANCHOR
05 05 51.3301	2-1/2" X 3/8" VERTICAL MTL. STRINGER
05 05 51.3302	TYP. 1" DIA MTL. RUNGS @ 12" O.C. CONT. WELD TO EACH STRINGER
05 05 51.3303	TYP. 12"MIN. X 2" WIDE BENT STEEL 3/8" PLATE SUPPORT CONT. WELD TO STRINGER SO THAT MIN. CLEARANCE FROM CENTERLINE OF RUNG AND NEAREST OBSTRUCTION IS 7" U.O.N.
05 21 19.00K0	TYP. K SERIES OPEN WEB STEEL JOIST, SEE STRUCTURAL.
05 51 33.A000	STEEL ROOF ACCESS LADDER
05 52 13.2000	TYP. STAINLESS STEEL PIPE AND TUBE RAILING.
05 52 13.2012	TYP. STAINLESS STEEL PIPE AND TUBE RAILING, INFILL HORIZONTAL 1-1/4" NOM. HSS 1.660 X 0.140 PIPE.
05 52 13.2013	TYP. STAINLESS STEEL PIPE AND TUBE RAILING, HAND RAIL.
05 52 13.2017	TYP. STAINLESS STEEL PIPE AND TUBE RAILING, GUARD RAIL.
05 52 13.2031	TYP. STAINLESS STEEL PIPE AND TUBE RAILING, POST 1-1/2" NOM. HSS 1.900 X 0.188 PIPE @ 3'-0" OC MAX..
05 52 13.2053	TYP. STAINLESS STEEL PIPE AND TUBE RAILING, HANDRAIL RAIL SUPPORTS AS REQ'D.
05 52 13.2056	TYP. STAINLESS STEEL PIPE AND TUBE RAILING, EMBED POST MIN. OF 5".
07 26 16.0315	TYP. 15 MIL BELOW GRADE VAPOR BARRIER.
09 22 16.G000	TYPICAL 6" GALV. METAL STUD FRAMING @16" OC UNO.
09 22 16.G040	TYP. 16 GA. 6" GALV. METAL STUD BLOCKING.
09 29 00.X00A	TYPICAL 5/8" TYPE 'X' GYPSUM WALL BOARD
09 65 19.0000	TYP. LUXARY VINYL COMPOSITION TILE, SEE SCHEDULE.
10 26 13.5250	TYP. 2" BRUSHED ALUMINUM WALL CORNER GUARD.
22 42 39.0001	TYP. RECESSED EXTERIOR WALL HYDRANT, SEE PLUBMING.
31 23 23.2385	TYP. COMPACTED FILL TO A MIN. OF 85% COMPACTION AS PER ASTM D1557.
31 31 16.1300	TYP. SPRAY TERMITE TOXICANT BARRIER.
32 16 23.0505	TYP. 5" BROOM FINISHED CONCRETE SIDEWALK.
34 01 73.0092	TYP. PRESERVE EDGE OF AIRFIELD CONSTRUCTION. COORDINATE PROTECTION OF BUILT ELEMENTS WITH ADJACENT PROJECT.

SUBMITTAL

CONTRACTOR SHALL PROVIDE FABRICATION DRAWINGS/ CALCULATIONS SIGNED & SEALED BY A FLORIDA REGISTERED ENGINEER IN COMPLIANCE WITH FLORIDA BUILDING CODE WITH SUPPLEMENTS FOR ALL FABRICATED STAIRS, HANDRAILS AND/OR PLATFORMS. MINIMUM 50 PLF AND 200 POUND CONCENTRATRATED DESIGN LOADS. DOCUMENTS ARE TO BE PROVIDED BY THE SAME ROUTING METHOD AS DRAWINGS WERE SUBMITTED TO GROWTH MANAGEMENT. THIS IS TO BE SUBMITTED BEFORE A FRAMING INSPECTION. BUILDER WILL NOT BE ABLE TO SCHEDULE A FRAMING INSPECTION UNTIL A RESPONSE IS APPROVED. 2017 FBC 104.9, 107.2.1; FLORIDA ADMINISTRATIVE CODE 9B-72.005



A2 RAILING AT GATE DOOR

1/2" = 1'-0"

SCALE: 1 1/2" = 1'-0"
0 2" 4" 8" 16"

SCALE: 1/2" = 1'-0"
0 6" 12" 24" 48"

SCALE: 1/4" = 1'-0"
0 1' 2' 4' 8'

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
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WWW.MLM-MARTIN.COM
AA-C002208
ALL JOB #'S TYPE PROPERTY
MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	AS NOTED

Drawing Title:

METAL FABRICATION DETAILS

BID DOCUMENTS

Drawing No.:

A851

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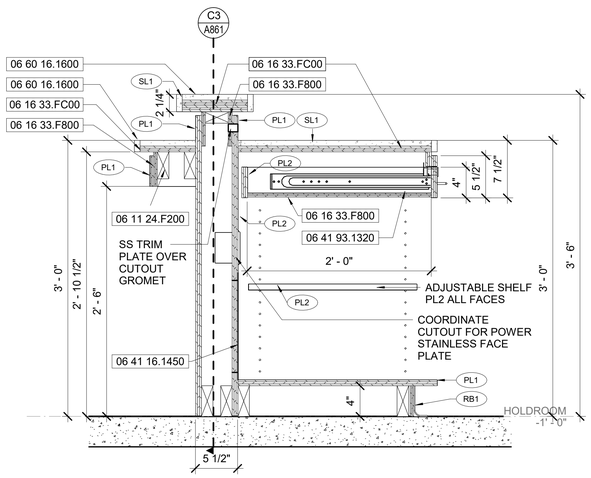
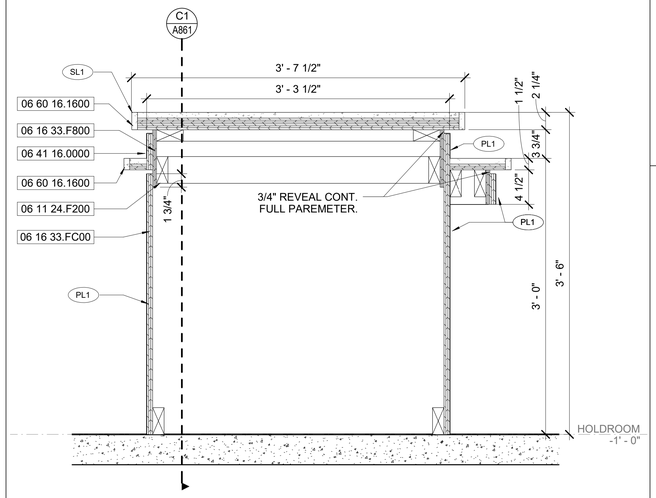


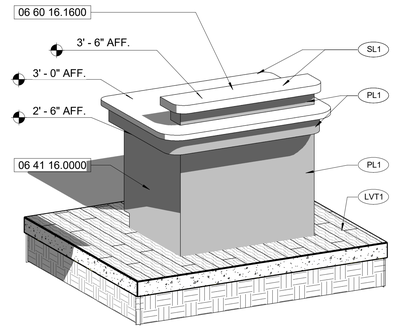
C1 MILLWORK SECTION

1 1/2" = 1'-0"

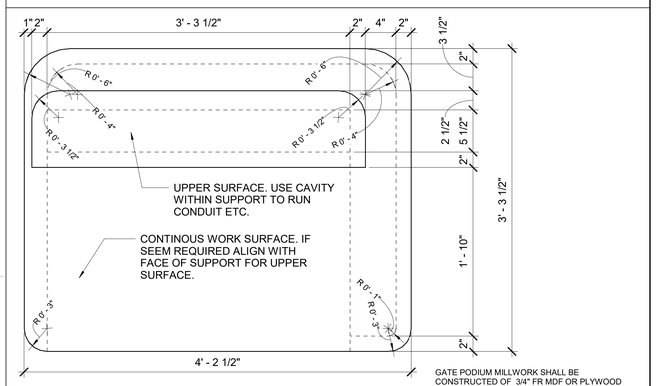


C3 MILLWORK SECTION

1 1/2" = 1'-0"



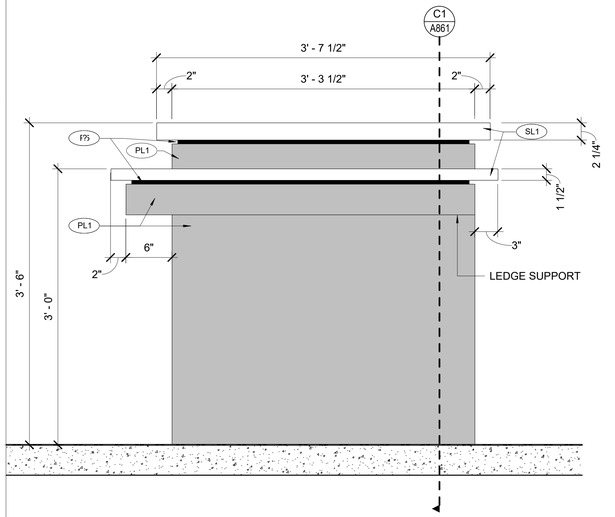
D4 MILLWORK PERSPECTIVE



C4 HOLD ROOM PODIUM PLAN

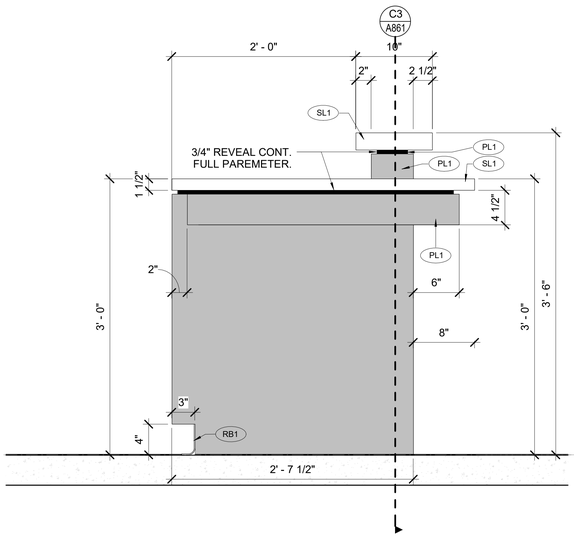
1 1/2" = 1'-0"

GATE PODIUM MILLWORK SHALL BE CONSTRUCTED OF 3/4" FR MDF OR PLYWOOD BOARD NOM. FR TREATED 2X. BLOCKING LAMINATED BY PL1 FINISH FOR ALL EXPOSED FACES W/ PL2 FINISH FOR ALL EXPOSED SURFACE ON INTERIOR OF DRAWERS AND CABINENTS. ALL HORIZONTAL SURFACES (EXCEPT FOR DRAW/ CAB. INTERIORS OR ADJUSTABLE SHELVES) SHALL BE SL1 SOLID SURFACE.



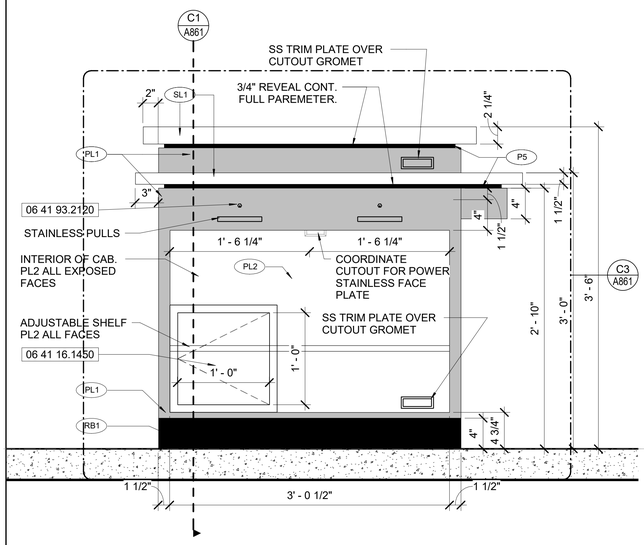
A1 HOLDROOM PODIUM FRONT

1 1/2" = 1'-0"



A2 HOLDROOM PODIUM SIDE

1 1/2" = 1'-0"



A4 HOLDROOM PODUIM BACK

1 1/2" = 1'-0"

SCALE: 1 1/2" = 1'-0"

0 2" 4" 8" 16"

KEYNOTES

NO.	
06 11 24.F200	TYP. FIRE RETARDINT WOOD BLOCKING NAILER, CONT. CUT FROM (2) 2X NOMINAL.
06 16 33.F800	TYP. 1/2" FR PLYWOOD.
06 16 33.FC00	TYP. 3/4" FR PLYWOOD.
06 41 16.0000	PLASTIC LAMINATE CLAD CASEWORK.
06 41 16.1450	TYP. PLASTIC LAMINATE CLAD ACCESS PANEL CASEWORK.
06 41 93.1320	TYP. HEAVY DUTY FULL EXTENSION STAINLESS STEEL SLIDE CASEWORK HARDWARE.
06 41 93.2120	TYP. STAINLESS STEEL CASEWORK LOCK HADRWARE.
06 60 16.1600	TYP. SOLID SURFACING COUNTERTOPS.

C19-2811- AP
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of Satellite
Concourse 'C'

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WWW.MLM-MARTIN.COM
AA-C002208
ALM 30B-F TYPE PROPERTY
MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	1 1/2" = 1'-0"

Drawing Title:
MILLWORK DETAILS HOLDROOM PODIUM
BID DOCUMENTS

Drawing No.:
A861

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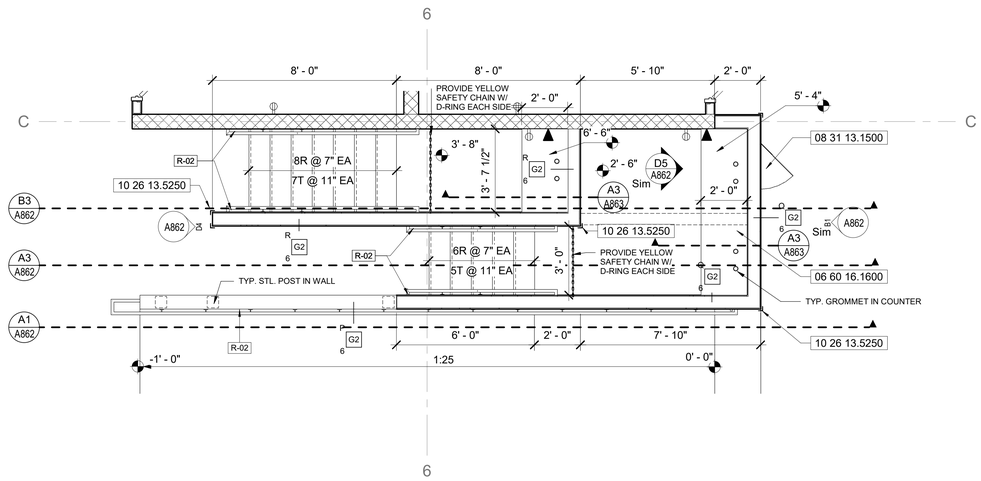
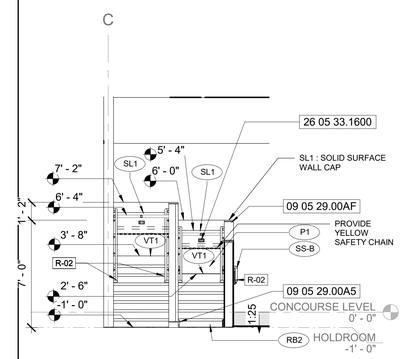


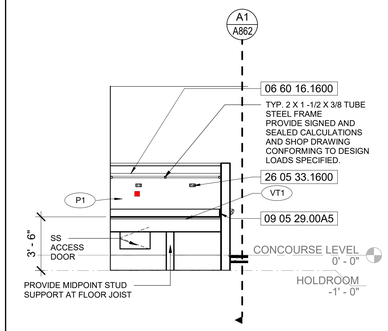
D1 ENLARGED PLAN - TSA PODIUM

3/8" = 1'-0"



D4 LEO PODIUM ELEVATION

1/4" = 1'-0"

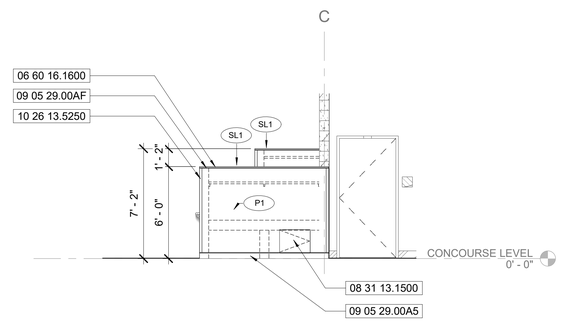


D5 TSA PODIUM - SECTION

1/4" = 1'-0"

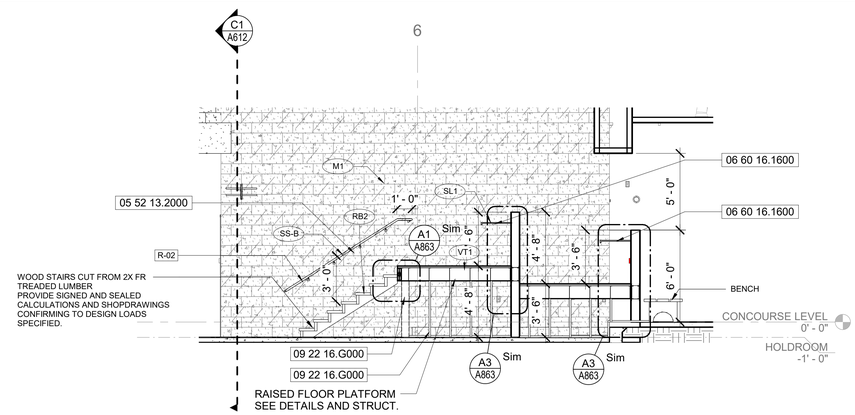
KEYNOTES

NO.	
03 31 00.B104	TYP. 4" STRUCTURAL SLAB-ON-GRADE, SEE STRUCTURAL.
05 52 13.2000	TYP. STAINLESS STEEL PIPE AND TUBE RAILING.
06 60 16.1600	TYP. SOLID SURFACING COUNTERTOPS.
08 31 13.1500	TYPICAL GALV. MTL. CEILING ACCESS DOOR, PAINT TO MATCH SURROUNDING SURFACE.
09 05 29.00A5	TYP. ALUMINUM GYPSUM BOARD REVEAL BASE ACCESSORY.
09 05 29.00AF	TYP. ALUMINUM GYPSUM BOARD 'F' REVEAL ACCESSORY.
09 22 16.G000	TYPICAL 6" GALV. METAL STUD FRAMING @16" OC UNO.
10 26 13.5250	TYP. 2" BRUSHED ALUMINUM WALL CORNER GUARD.
26 05 33.1600	TYP. ELECTRICAL BOX WITH FACEPLATE, COORDINATE FACEPLATE WITH DIV. 26, 27 AND 28.
26 05 36.0000	TYP. CONCEALED S.S. WIRE TRAY SUSPEND FROM COUNTER.



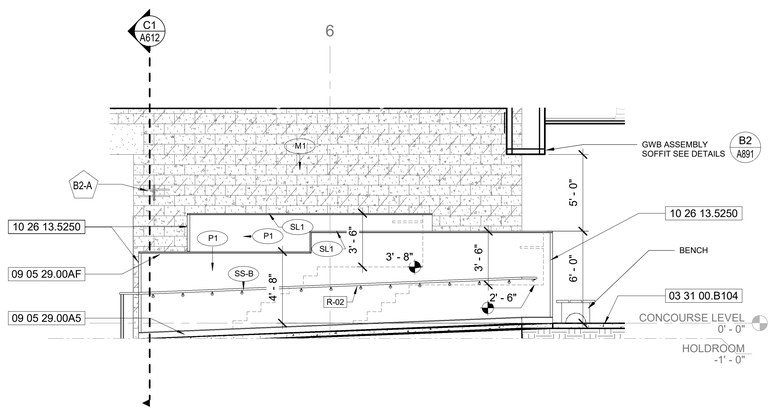
B1 FRONT ELEVATION OF LEO/TSA PODIUM

1/4" = 1'-0"



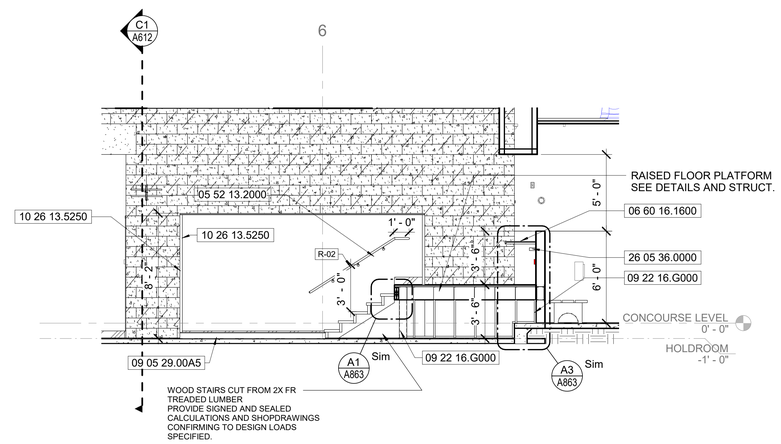
B3 SECTION AT LEO/TSA PLATFORM

1/4" = 1'-0"



A1 SIDE ELEVATION OF LEO/TSA PODIUM

1/4" = 1'-0"



A3 SECTION AT TSA PLATFORM

1/4" = 1'-0"

SCALE: 3/8" = 1'-0"

0 8" 16" 32" 64"

SCALE: 1/4" = 1'-0"

0 1' 2' 4' 8'

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
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MAITLAND, FL 32751
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AA-C002208
MLM 30B-F TYPE PROPERTY
MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

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Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	AS NOTED

Drawing Title:
MILLWORK DETAILS LEO/TSA PODIUM
BID DOCUMENTS

Drawing No.:
A862

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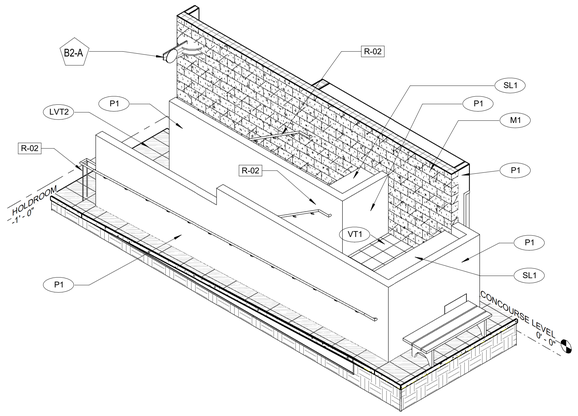
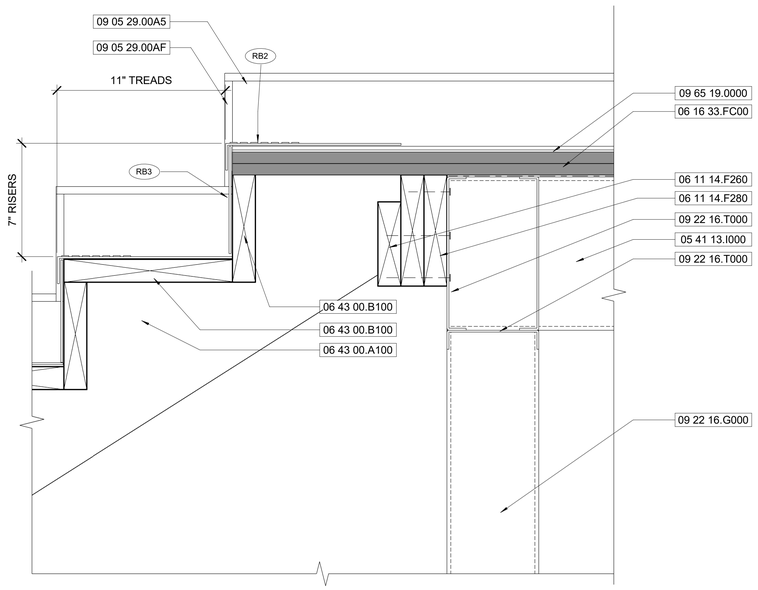
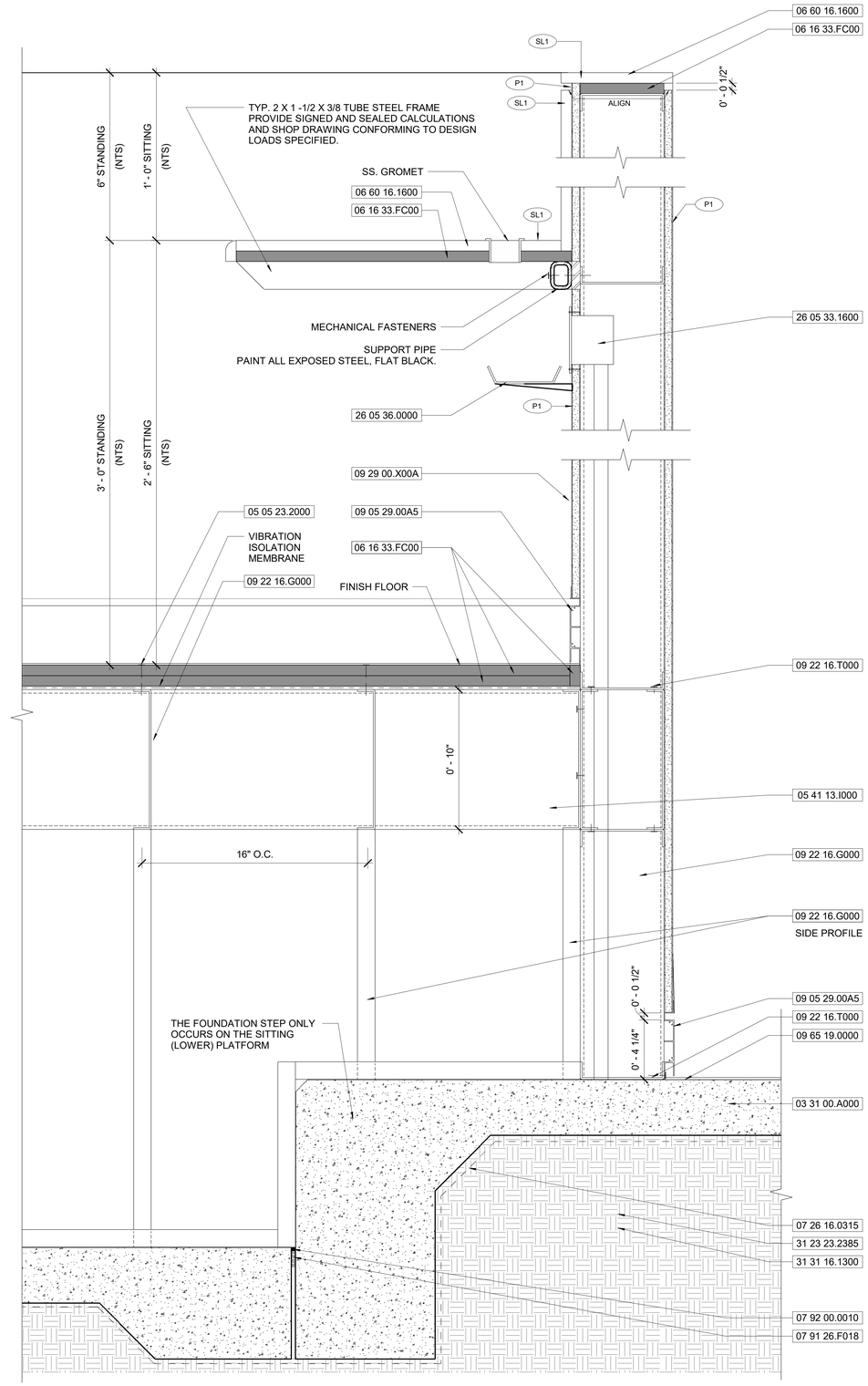


D1 PERSPECTIVE OF LEO/STA PLATFORM



A1 LEO PLATFORM STAIR SECTION DETAIL

3" = 1'-0"



A3 ELEVATED PLATFORM SECTION DETAIL

3" = 1'-0"

KEYNOTES

NO.	
03 31 00.A000	TYP. CONCRETE SLABS-ON-GRADE, SEE STRUCTURAL
05 05 23.2000	TYP. STAINLESS STEEL FASTENER(S).
05 41 13.I000	10" "C" JOIST
06 11 14.F260	TYP. 2X6 NOMINAL FIRE RETARDINT WOOD BLOCKING, CONT.
06 11 14.F280	TYP. 2X8 NOMINAL FIRE RETARDINT WOOD BLOCKING, CONT.
06 16 33.FC00	TYP. 3/4" FR PLYWOOD.
06 43 00.A100	TYP. 2X_ NOMINAL FR TREATED WOOD STRINGER CUT.
06 43 00.B100	TYP. 2X_ NOMINAL FR TREATED WOOD TREADS AND RISERS.
06 60 16.1600	TYP. SOLID SURFACING COUNTERTOPS.
07 26 16.0315	TYP. 15 MIL BELOW GRADE VAPOR BARRIER.
07 91 26.F018	TYP. 1/2" MINIERAL FIBER JOINT FILLER CONT.
07 92 00.0010	TYP. JOINT SEALANT, CONT.
09 05 29.00A5	TYP. ALUMINUM GYPSUM BOARD REVEAL BASE ACCESSORY.
09 05 29.00AF	TYP. ALUMINUM GYPSUM BOARD 'F' REVEAL ACCESSORY.
09 22 16.G000	TYPICAL 6" GALV. METAL STUD FRAMING @16" OC UNO.
09 22 16.T000	TYPICAL GALV. METAL TRACK RUNNER CONT.
09 29 00.X00A	TYPICAL 5/8" TYPE 'X' GYPSUM WALL BOARD
09 65 19.0000	TYP. LUXARY VINYL COMPOSITION TILE, SEE SCHEDULE.
26 05 33.1600	TYP. ELECTRICAL BOX WITH FACEPLATE, COORDINATE FACEPLATE WITH DIV. 26, 27 AND 28.
26 05 36.0000	TYP. CONCEALED S.S. WIRE TRAY SUSPEND FROM COUNTER.
31 23 23.2385	TYP. COMPACTED FILL TO A MIN. OF 85% COMPACTION AS PER ASTM D1557.
31 31 16.1300	TYP. SPRAY TERMITE TOXICANT BARRIER.

SCALE: 3" = 1'-0"

0 1" 2" 4" 8"

C19-2811- AP
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ALM 308-2 TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

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Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3" = 1'-0"

Drawing Title:

LEO/TSA PODIUM DETAILS

BID DOCUMENTS

Drawing No.:

A863

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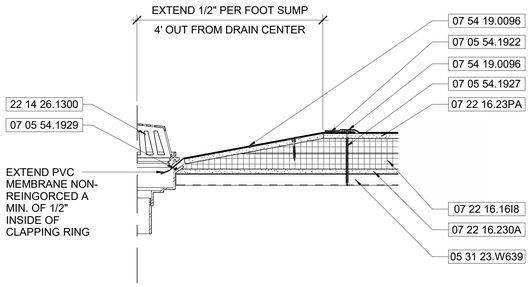
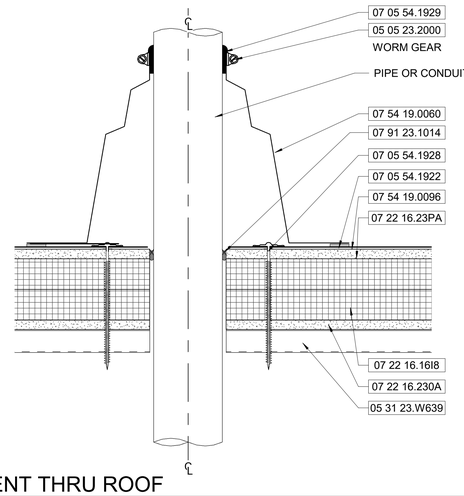


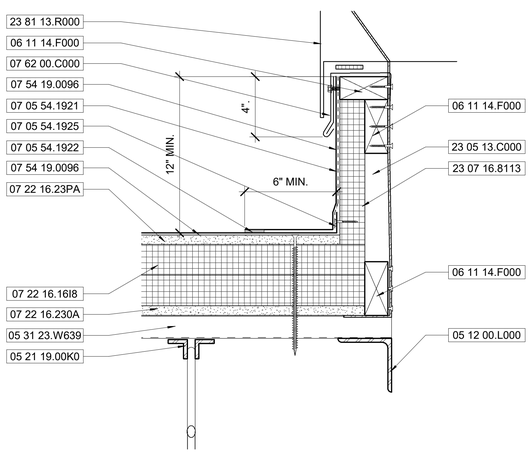
E1 ROOF DRAIN DETAIL

1 1/2" = 1'-0"



C1 VENT THRU ROOF

3" = 1'-0"



A1 EQUIPMENT ROOF CURB

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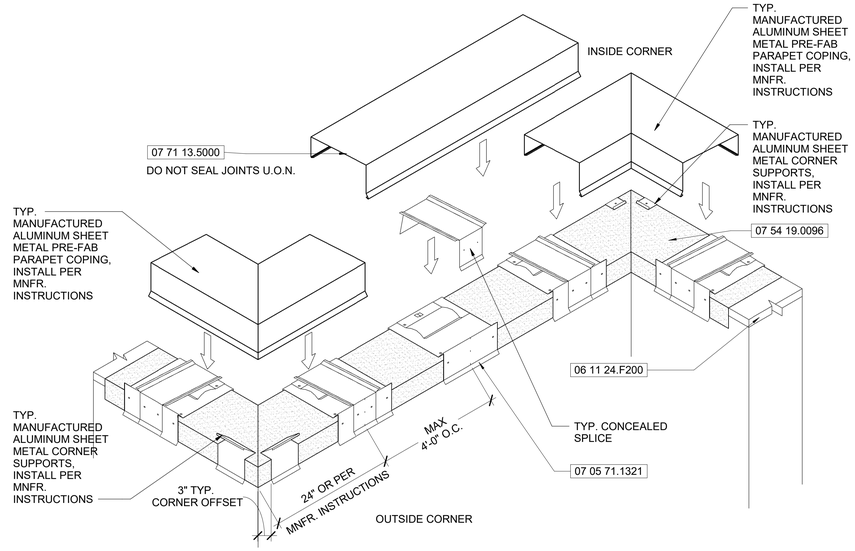

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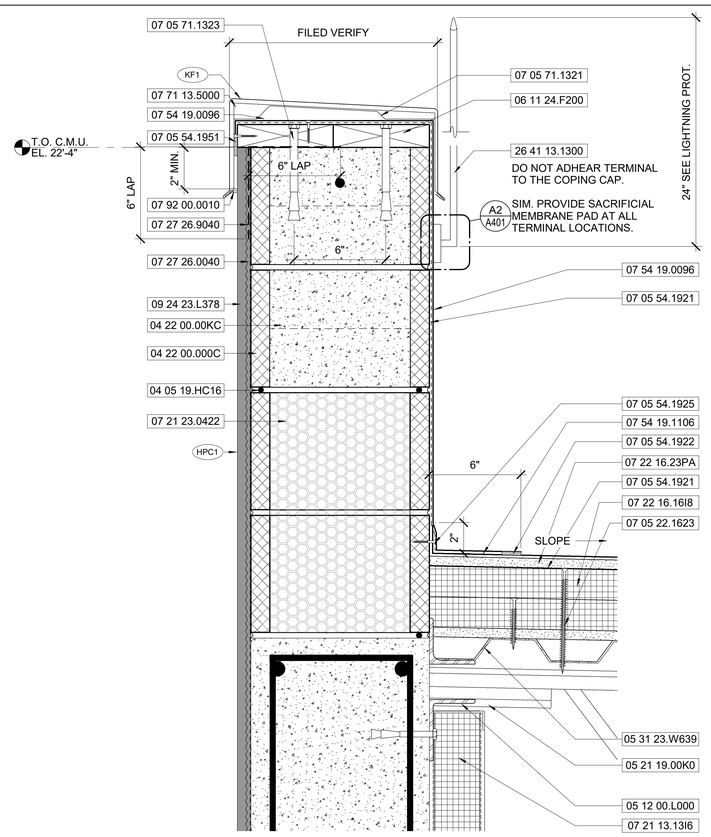

A3 TYP. PARAPET COPING DETAIL

3" = 1'-0"

KEYNOTES

NO.	
04 05 19.HC16	TYP. MASONRY HORIZONTAL GALVANIZED WIRE REINFORCING @ 16" O.C. MAX
04 22 00.000C	TYP. 12" NOMINAL CONCRETE MASONRY UNIT
04 22 00.00KC	TYP. 12" NOMINAL GROUT FILLED CONCRETE MASONRY KNOCK-OUT UNIT.
05 05 23.2000	TYP. STAINLESS STEEL FASTENER(S).
05 12 00.L000	TYP. STEEL ANGLE 'L' SHAPE MEMBER, SEE STRUCTURAL.
05 21 19.00K0	TYP. K SERIES OPEN WEB STEEL JOIST, SEE STRUCTURAL.
05 31 23.W639	TYP. 1-1/2" WR 20 GA. G90 STEEL ROOF DECK, SEE STRUCTURAL.
06 11 14.F000	TYP. NOMINAL FIRE RETARDINT WOOD BLOCKING, CONT.
06 11 24.F200	TYP. FIRE RETARDINT WOOD BLOCKING NAILER, CONT. CUT FROM (2) 2X NOMINAL.
07 05 22.1623	TYP. ROOF BOARD INSULATION FASTENERS, SEE MNFR. INSTRUCTIONS.
07 05 54.1921	TYP. PVC ROOFING MEMBRANE ADHESIVE COAT.
07 05 54.1922	TYP. PVC ROOFING MEMBRANE CAP/FLASHING PLY WELD.
07 05 54.1925	TYP. PVC ROOF MEMBRANE SYSTEM TERMINATION HARDWARE, FASTEN AND SEAL PER NOA/FLORIDA PRODUCT APPROVAL OR 8" OC MIN. WHICHEVER IS MORE RESTRICTIVE.
07 05 54.1927	TYP. PVC ROOF MEMBRANE SYSTEM FASTENERS AND STRESS PLATE HARDWARE @ 12" OC AROUND SUMP.
07 05 54.1928	TYP. PVC ROOF MEMBRANE SYSTEM FASTENERS AND STRESS PLATE HARDWARE MIN. (4).
07 05 54.1929	TYP. PVC ROOF MEMBRANE SYSTEM SEALANT.
07 05 54.1951	TYP. PVC ROOF MEMBRANE SYSTEM PREFORMED BUTYL TAPE SEALANT.

KEYNOTES

NO.	
07 05 71.1321	TYP. MANUFACTURED COPING CLEAT, INSTALL PER MNFR. INSTRUCTIONS.
07 05 71.1323	TYP. 1/2" DIA. SS EXPANSION BOLTS W/4" EMBEDMENT MIN. @ 16" CENTERS STAGGERED. PROVIDED (2) SIDE BY SIDE BOLTS ON EACH END OF BLOCKING SPLICES. HEADS SHALL BE COUNTERSUNK.
07 21 13.13I6	TYP. 3" THICK, POLYISOCYANURATE RIGID FOAM BOARD INSULATION.
07 21 23.0422	TYP. FILL ALL UN-GROUTED CELLS WITH INJECTED FOAM FILL INSULATION.
07 22 16.16I8	TYP. 4" MIN. POLYISOCYANURATE RIGID FOAM ROOF BOARD INSULATION.
07 22 16.23PA	TYP. 5/8" PRIMED DENS DECK ROOF INSULATION COVER BOARD.
07 22 16.230A	TYP. 5/8" DENS DECK ROOF INSULATION COVER BOARD.
07 27 26.0040	TYP. 40 MILL THICK FLUID-APPLIED MEMBRANE VAPOR RETARDING AIR BARRIER.
07 27 26.9040	TYP. 40 MILL THICK FLUID-APPLIED MEMBRANE VAPOR RETARDING AIR BARRIER JOINT REINFORCEMENT SELF ADHEARING SHEET.
07 54 19.0060	TYP. PVC MEMBRAINE ROOFING PRE-FORMED/MOLDED FLASHING.
07 54 19.0096	TYP. 60 MIL PVC MEMBRAINE ROOFING FLASHING SHEET.
07 54 19.1106	TYP. COLD ADHESIVE APPLIED, 60 MIL PVC MEMBRAINE ROOFING.
07 62 00.C000	TYP. STAINLESS STEEL COUNTER-FLASHING.
07 71 13.5000	TYP. ALUMNINUM MANUFACTURED COPING SYSTEM, INSTALLED PER MNFR. INSTRUCTIONS.
07 91 23.1014	TYP. 1/4" BACKER ROD WITH JOINT SEALANT, CONT.
07 92 00.0010	TYP. JOINT SEALANT, CONT.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
22 14 26.1300	TYP. FACILITY STORM ROOF DRAIN W/ INTRIGAL OVERFLOW, SEE PLUMBING.
23 05 13.C000	TYPICAL PRE-ENGINEERED MECHANICAL CURB FOR HVAC & FAN EQUIPMENT, SEE MECHANICAL
23 07 16.8113	TYP. RIGID INSULATION INSERTS FOR PRE-MANUFACTURED ROOF TOP MECHAINICAL EQUIPMENT CURB.
23 81 13.R000	TYP. PACKAGED ROOFTOP UNIT, SEE MECH.
26 41 13.1300	TYP. LIGHTNING PROTECTION TERMINAL, SEE ELECTRICAL.

SCALE: 3" = 1'-0"

0 1" 2" 4" 8"

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE. SUITE 107
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AA-C002208
ULM 30B-F TYPE PROPERTY
MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	AS NOTED

Drawing Title:

ROOFING DETAILS

BID DOCUMENTS

Drawing No.:

A871

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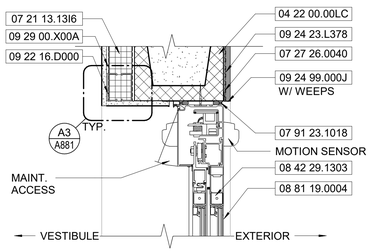
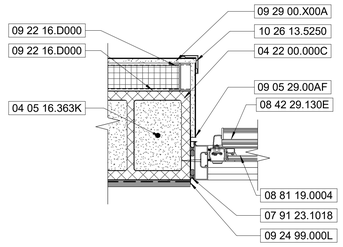
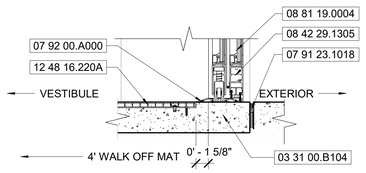


B1 EXT. SLIDING DOOR HEAD
1 1/2" = 1'-0"



B2 EXT. SLIDING DOOR JAMB
1 1/2" = 1'-0"



B3 EXT. SLIDING DOOR SILL
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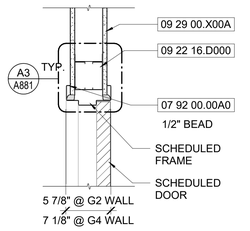
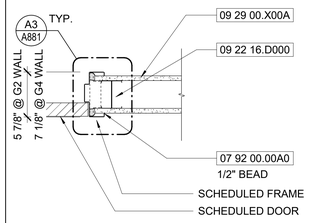
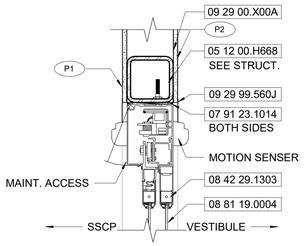


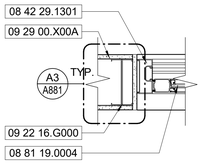
D4 HEAD @ GWB
1 1/2" = 1'-0"



D5 JAMB @ GWB
1 1/2" = 1'-0"



C1 INT. SLIDING DOOR HEAD
1 1/2" = 1'-0"



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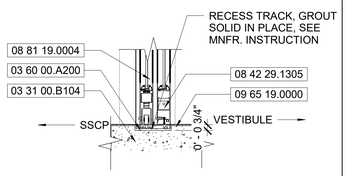
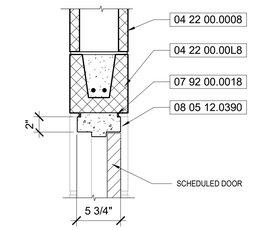
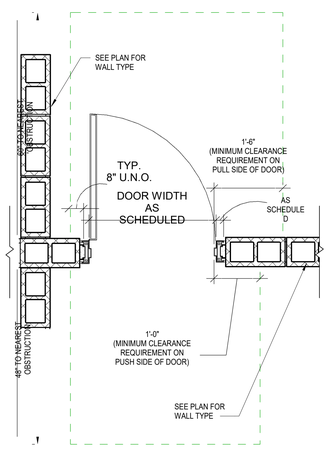
1 1/2" = 1'-0"



C3 INT. SLIDING DOOR SILL
1 1/2" = 1'-0"

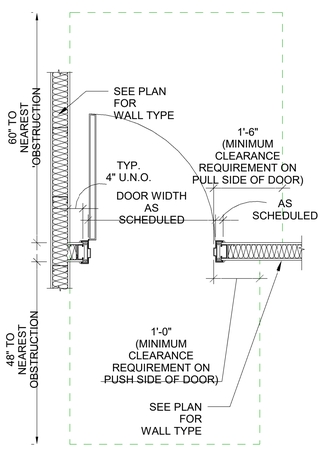


C4 HEAD @ CMU (i)
1 1/2" = 1'-0"



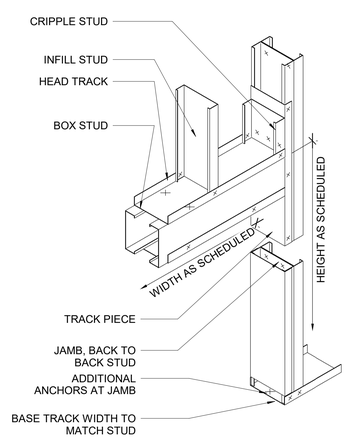
NOTE: MINIMUM CLEARANCES TO OBSTRUCTIONS SHOWN FOR FRONTAL APPROACH. SEE FBC: ACCESSIBILITY FOR ALTERNATE DOOR APPROACH CLEARANCES

A1 DOOR MOUNTING DETAIL
3/4" = 1'-0"



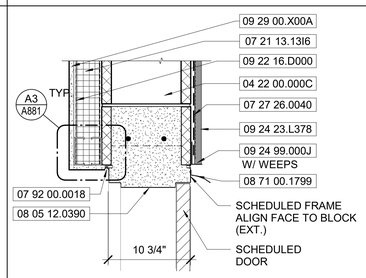
NOTE: MINIMUM CLEARANCES TO OBSTRUCTIONS SHOWN FOR FRONTAL APPROACH. SEE FBC: ACCESSIBILITY FOR ALTERNATE DOOR APPROACH CLEARANCES

A2 DOOR MOUNTING DETAIL
3/4" = 1'-0"

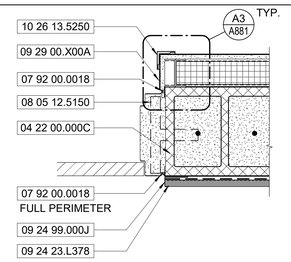


NOTE: EACH D0OR TO HAVE (5) FIVE ANCHORS PER JAMB

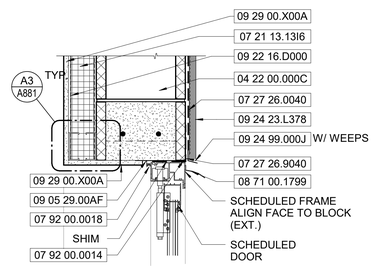
A3 DOOR FRAMING DETAIL
N.T.S.



B4 HEAD @ STUCCO
1 1/2" = 1'-0"



B5 JAMB @ STUCCO
1 1/2" = 1'-0"



A4 HEAD @ FOLDING
1 1/2" = 1'-0"

KEYNOTES

NO.	
03 31 00.B104	TYP. 4" STRUCTURAL SLAB-ON-GRADE, SEE STRUCTURAL.
03 60 00.A200	TYPICAL FILL SOLID W/ GROUT
04 05 16.363K	TYP. FILL CELL MASONRY W/ 3000 PSI GROUT.
04 22 00.000C	TYP. 12" NOMINAL CONCRETE MASONRY UNIT
04 22 00.00L8	TYP. 8" NOM. LINTEL CONCRETE MASONRY UNIT.
04 22 00.00LC	TYP. 12" NOM. LINTEL CONCRETE MASONRY UNIT.
04 22 00.0008	TYP. 8" NOMINAL CONCRETE MASONRY UNIT.
05 12 00.H668	TYP. HSS 6X6X1/2 STRUCTURAL STEEL FRAMING, SEE STRUCTURAL.
07 21 13.13I6	TYP. 3" THICK, POLYISOCYANURATE RIGID FOAM BOARD INSULATION.
07 27 26.0040	TYP. 40 MILL THICK FLUID-APPLIED MEMBRANE VAPOR RETARDING AIR BARRIER.
07 27 26.9040	TYP. 40 MILL THICK FLUID-APPLIED MEMBRANE VAPOR RETARDING AIR BARRIER JOINT REINFORCEMENT SELF ADHEARING SHEET.
07 91 23.1014	TYP. 1/4" BACKER ROD WITH JOINT SEALANT, CONT.
07 91 23.1018	TYP. 1/2" BACKER ROD WITH JOINT SEALANT, CONT.
07 92 00.00A0	TYP. JOINT SEALANT, FULL PERIMETER.
07 92 00.0014	TYP. 1/4" JOINT SEALANT, CONT.
07 92 00.0018	TYP. 1/2" JOINT SEALANT, CONT.
07 92 00.A000	TYPICAL BED OF SEALANT
08 05 12.0390	TYP. FILL FRAME SOLID WITH GROUT.
08 05 12.5150	TYP. (5) MASONRY TIE ANCHORS PER JAMB.
08 42 29.130E	TYP. ALUMINUM FRAMED AUTOMATIC ENTRANCE PANIC EGRESS HARDWARE.
08 42 29.1301	TYP. ALUMINUM FRAMED AUTOMATIC ENTRANCE JAMB.
08 42 29.1303	TYP. ALUMINUM FRAMED AUTOMATIC ENTRANCE HEADER.
08 42 29.1305	TYP. ALUMINUM FRAMED AUTOMATIC ENTRANCE SILL.
08 71 00.1799	TYP. DOOR DRIP HARDWARE AS SCHEDULED.
08 81 19.0004	TYP. 1/4" CLEAR TEMPERED GLAZING.
09 05 29.00AF	TYP. ALUMINUM GYPSUM BOARD 'F' REVEAL ACCESSORY.
09 22 16.D000	TYPICAL 3 5/8" GALV. METAL STUD FRAMING @ 24" OC UNO.
09 22 16.G000	TYPICAL 6" GALV. METAL STUD FRAMING @16" OC UNO.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
09 24 99.000J	TYP. CEMENT PLASTERING 'J' TRIM ACESSORY.
09 24 99.000L	TYP. CEMENT PLASTERING 'L' TRIM ACESSORY.
09 29 00.X00A	TYPICAL 5/8" TYPE 'X' GYPSUM WALL BOARD
09 29 99.560J	TYP. GALV. GWB ASSEMBLY 'J' CASING BEAD TRIM ACCESSORY.
09 65 19.0000	TYP. LUXARY VINYL COMPOSITION TILE, SEE SCHEDULE.
10 26 13.5250	TYP. 2" BRUSHED ALUMINUM WALL CORNER GUARD.
12 48 16.220A	TYP. 5/8" SS 304 WALKOFF ENTRY MAT.

SCALE: 3/4" = 1'-0"
0 4" 8" 16" 32"

SCALE: 1 1/2" = 1'-0"
0 2" 4" 8" 16"

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction
of Satellite
Concourse 'C'

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SEAL

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Issue Date:	30-NOV-2020
Drawing Scale:	AS NOTED

Drawing Title:

DOOR DETAILS

BID DOCUMENTS

Drawing No.:

A881

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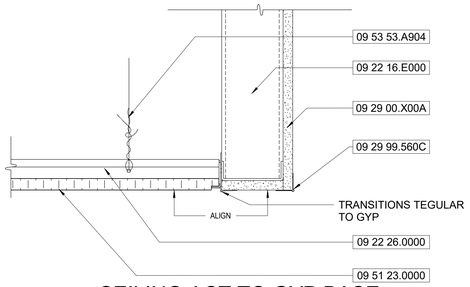
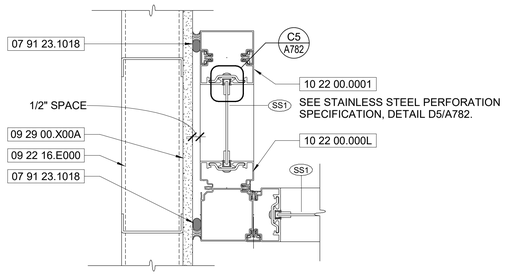
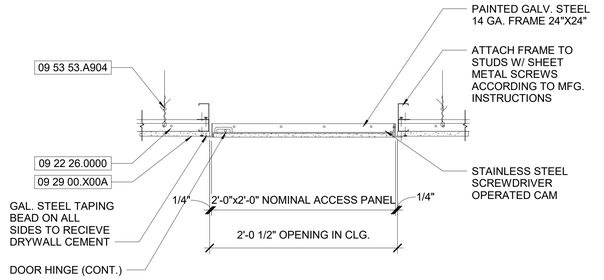
12/8/2020 5:49:03 PM



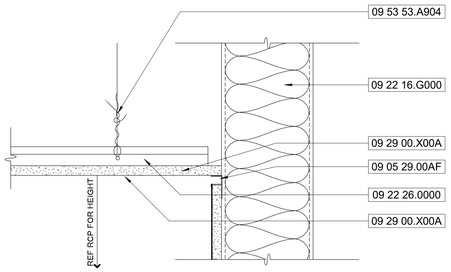
E1 CEILING ACT TO GYP BASE
3" = 1'-0"



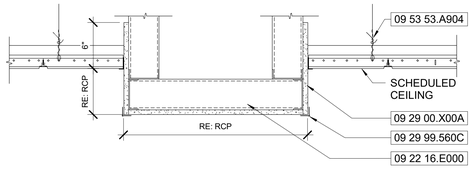
E2 BULKHEAD DETAIL @ TSA PARTITION END WALL
3" = 1'-0"



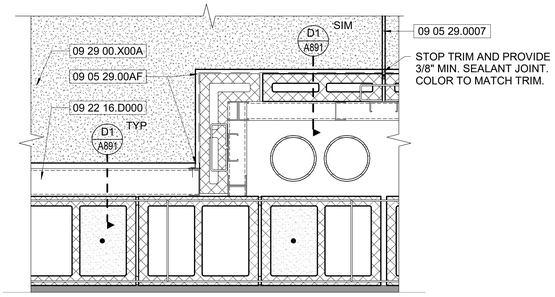
E5 CEILING ACCESS DETAIL
1 1/2" = 1'-0"



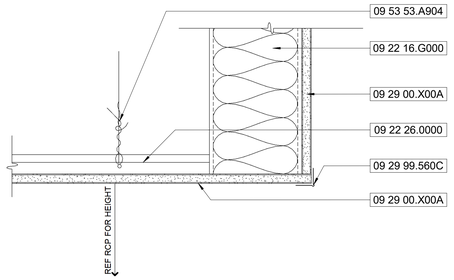
D1 CEILING GYP TO GYP_INSIDE
3" = 1'-0"



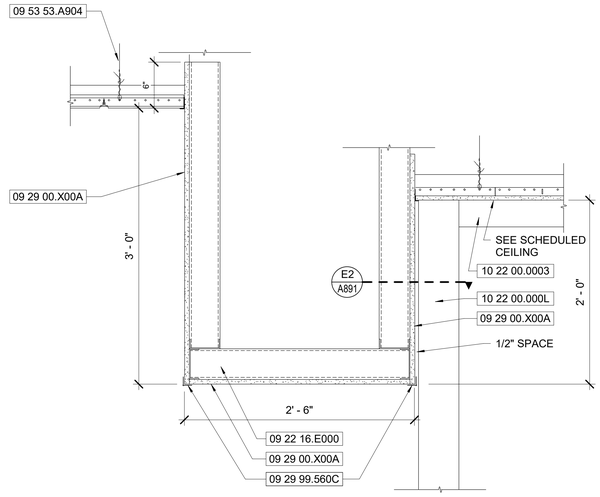
D2 CEILING DETAIL @ GYP BULKHEAD
1 1/2" = 1'-0"



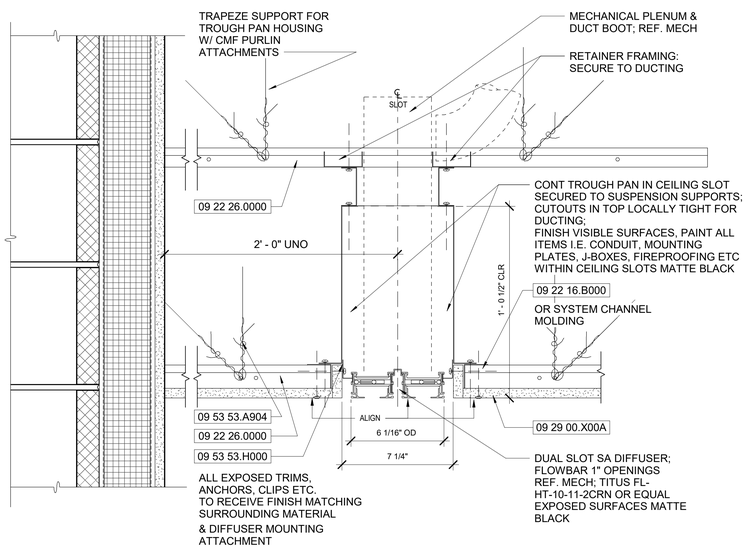
D5 CEILING TRIM AT CMU PILASTER
1 1/2" = 1'-0"



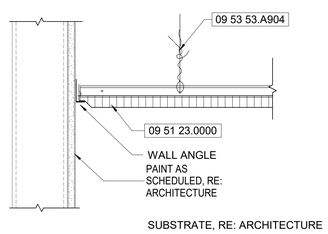
C1 CEILING GYP TO GYP_OUTSIDE
3" = 1'-0"



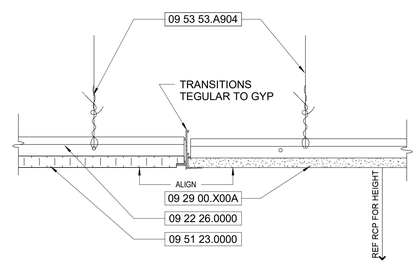
B2 CEILING DETAIL @ TSA BULKHEAD
1 1/2" = 1'-0"



A1 GWB CEILING DEVICE TROUGH SLOT_LINEAR SA -SECT
3" = 1'-0"



A2 CEILING SUSPENDED TRIM
3" = 1'-0"



A3 CEILING ACT TO CEILING GYP
3" = 1'-0"

KEYNOTES

NO.	
07 91 23.1018	TYP. 1/2" BACKER ROD WITH JOINT SEALANT, CONT.
09 05 29.00AF	TYP. ALUMINUM GYPSUM BOARD 'F' REVEAL ACCESSORY.
09 05 29.0007	TYP. GWB ASSEMBLY CONTROL JOINT ACCESSORY.
09 22 16.B000	TYPICAL 2 1/2" GALV. METAL STUD FRAMING @ 24" OC UNO.
09 22 16.D000	TYPICAL 3 5/8" GALV. METAL STUD FRAMING @ 24" OC UNO.
09 22 16.E000	TYP. 4" GALV. METAL STUD FRAMING @ 24" OC UNO.
09 22 16.G000	TYPICAL 6" GALV. METAL STUD FRAMING @16" OC UNO.
09 22 26.0000	TYP. GYPSUM ASSEMBLY SUSPENSION SYSTEM, INSTALL PER MNFR. INSTRUCTIONS.
09 29 00.X00A	TYPICAL 5/8" TYPE 'X' GYPSUM WALL BOARD
09 29 99.560C	TYP. GALV. GWB ASSEMBLY CORNER BEAD TRIM ACCESSORY.
09 51 23.0000	TYP. ACOUSITCAL TILE CEILING SYSTEM, REF. FINISH SCHEDULES.
09 53 53.A904	TYPICAL 9 GAUGE GALV. METAL HANGER WIRE @ 48" O.C. EACH WAY
09 53 53.H000	TYPICAL SUPPORT CLIP FOR MECHANICAL DIFFUSERS/GRILLS.
10 22 00.000L	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - 90 DEGREE CORNER EXTRUSION.
10 22 00.0001	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - END CAP EXTRUSION.
10 22 00.0003	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY - HEADER EXTRUSION.

SCALE: 1 1/2" = 1'-0"
0 2" 4" 8" 16"

SCALE: 3" = 1'-0"
0 1" 2" 4" 8"

OKALOOSA COUNTY

FLY VPS

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SEAL

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Drawing Scale:	As indicated

Drawing Title:

CEILING DETAILS

BID DOCUMENTS

Drawing No.:

A891

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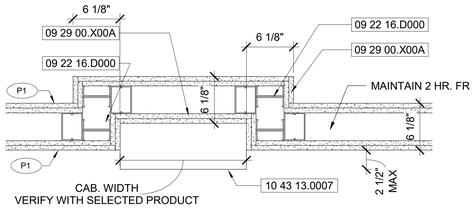
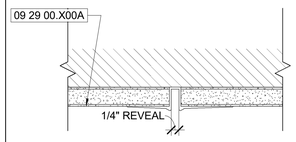
12/8/2020 5:49:12 PM



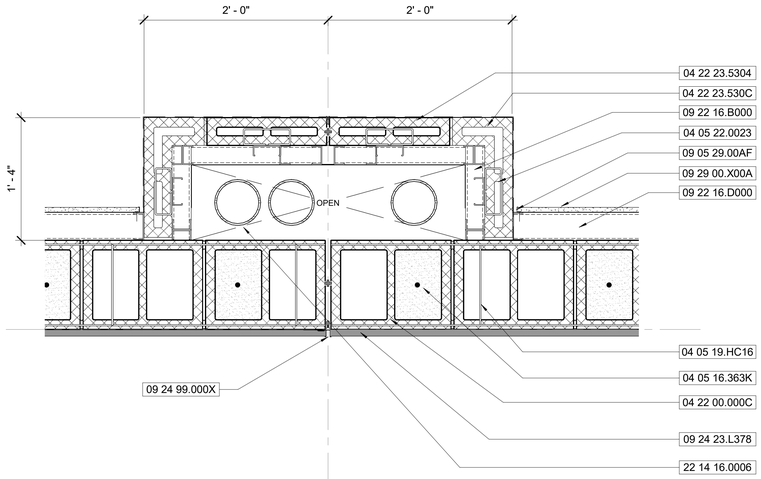
E3 RECESSED FE IN 2HR WALL

1 1/2" = 1'-0"



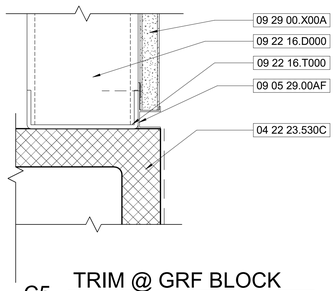
E5 GWB VERTICAL REVEAL

6" = 1'-0"



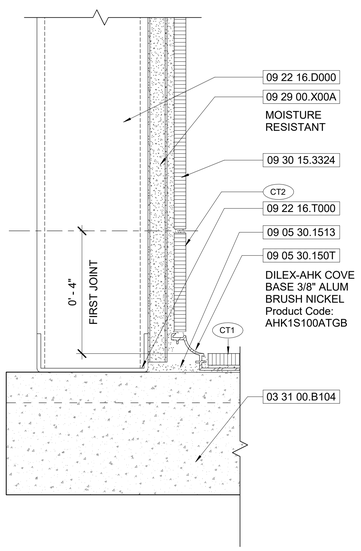
C3 GRF BLOCK PILASTER DETAIL

1 1/2" = 1'-0"



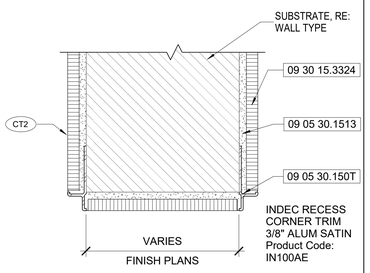
C5 TRIM @ GRF BLOCK

6" = 1'-0"



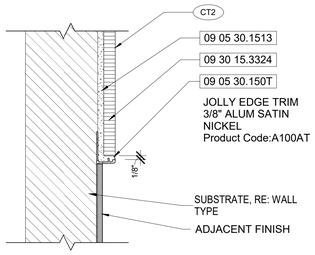
A1 LARGE FORMAT WALL TILE

6" = 1'-0"



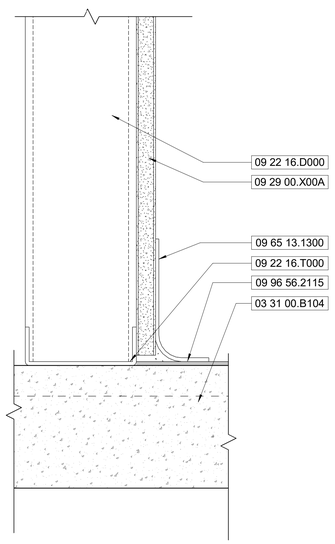
B2 TYPICAL TILE WALL END

6" = 1'-0"



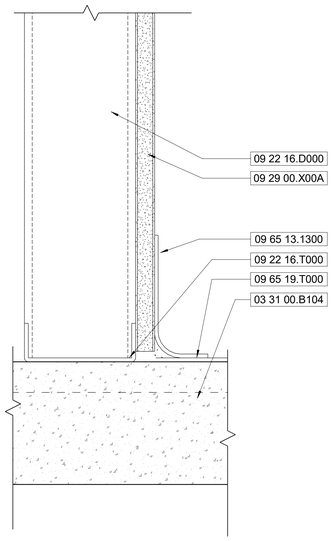
A2 TYP. TILE TERMINATION

6" = 1'-0"



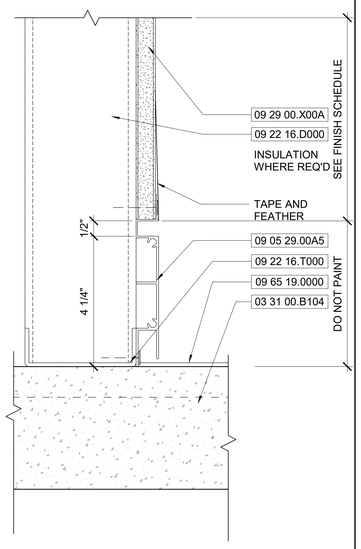
A3 VINYL WALL BASE - HPC

6" = 1'-0"



A4 VINYL WALL BASE - VCT

6" = 1'-0"



A5 ALUM. WALL BASE - LVT

6" = 1'-0"

SCALE: 1 1/2" = 1'-0"

0 2" 4" 8" 16"

SCALE: 6" = 1'-0"

0 1/2" 1" 2" 4"

KEYNOTES

NO.	
03 31 00.B104	TYP. 4" STRUCTURAL SLAB-ON-GRADE, SEE STRUCTURAL.
04 05 16.363K	TYP. FILL CELL MASONRY W/ 3000 PSI GROUT.
04 05 19.HC16	TYP. MASONRY HORIZONTAL GALVANIZED WIRE REINFORCING @ 16" O.C. MAX
04 05 22.0023	TYP. MASONRY WALL TIES @ 16" OC, VERT. & HORZ.
04 22 00.000C	TYP. 12" NOMINAL CONCRETE MASONRY UNIT
04 22 23.530C	TYP. BURNISHED CORNER CONCRETE MASONRY UNIT
04 22 23.5304	TYP. 4" BURNISHED CONCRETE MASONRY UNIT
09 05 29.00A5	TYP. ALUMINUM GYPSUM BOARD REVEAL BASE ACCESSORY.
09 05 29.00AF	TYP. ALUMINUM GYPSUM BOARD 'F' REVEAL ACCESSORY.
09 05 30.150T	TYP. ALUM. TRIM EXTRUSION FOR PROCELIAN STONE TILE TRANSITION.
09 05 30.1513	TYP. PROCELIAN STONE TILE THIN-SET MATERIAL, SEE SPECIFICATIONS.
09 22 16.B000	TYPICAL 2 1/2" GALV. METAL STUD FRAMING @ 24" OC UNO.
09 22 16.D000	TYPICAL 3 5/8" GALV. METAL STUD FRAMING @ 24" OC UNO.
09 22 16.T000	TYPICAL GALV. METAL TRACK RUNNER CONT.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
09 24 99.000X	TYP. CEMENT PLASTERING EXPANSIN CHANNEL W/ 1/2" REVEAL SCREED ACESSORY.
09 29 00.X00A	TYPICAL 5/8" TYPE 'X' GYPSUM WALL BOARD
09 30 15.3324	TYP. 12" X 24" RECTIFIED, PROCELIAN STONE WALL TILING.
09 65 13.1300	TYP. 4" VINYL COVE BASE; SEE SCHEDULE/
09 65 19.0000	TYP. LUXARY VINYL COMPOSITION TILE, SEE SCHEDULE.
09 65 19.T000	TYP. VINYL COMPOSITION TILE; SEE SCHEDULE.
09 96 56.2115	TYP. TEXTURED EPOXY FLOOR HIGH PERFORMANCE COATING.
10 43 13.0007	TYP. WALL CABINENT MOUNTED AUTOMATIC ELECTRONIC DEFIBRILLATOR (AED).
22 14 16.0006	TYP. 6" STORM WATER LEADER, SEE PLUMBING, SUPPORT AS REQUIRED TO 12" CMU ONLY.

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
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MAITLAND, FL 32751
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AA-C002208
ULM 30B-F TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	AS NOTED

Drawing Title:

WALL FINISH DETAILS

BID DOCUMENTS

Drawing No.:

A892

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

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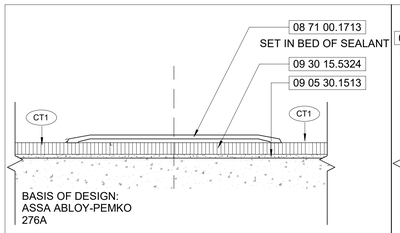
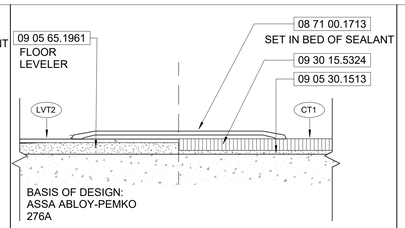
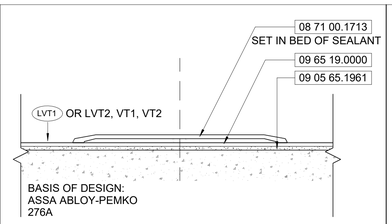


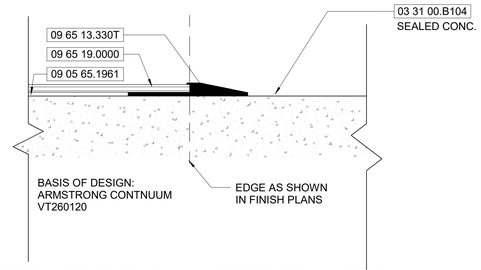
E1 CT TO CT THRESHOLD
6" = 1'-0"



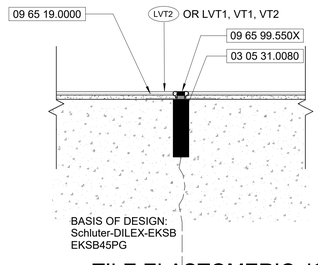
E2 CT TO LVT THRESHOLD
6" = 1'-0"



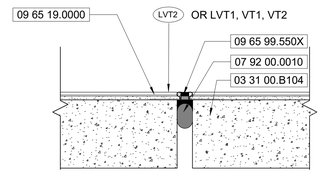
E3 LVT OR VT THRESHOLD
6" = 1'-0"



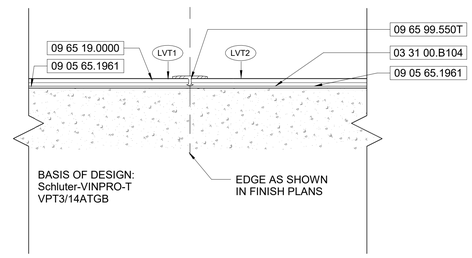
E4 RESILIENT TO CONCRETE TRANSITION
12" = 1'-0"



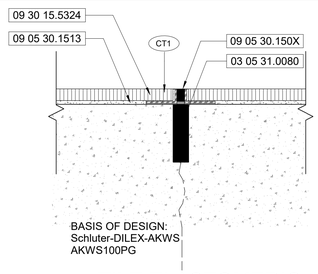
D2 TILE ELASTOMERIC JOINT
6" = 1'-0"



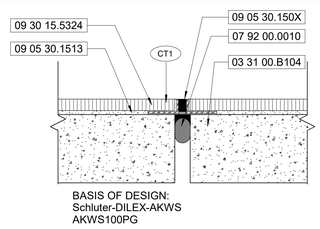
D3 TILE ELASTOMERIC JOINT
6" = 1'-0"



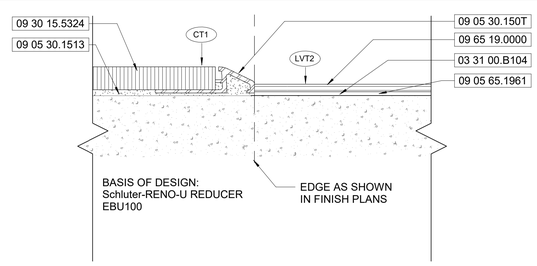
D4 LVT1 TO LVT2 TRANSITION
12" = 1'-0"



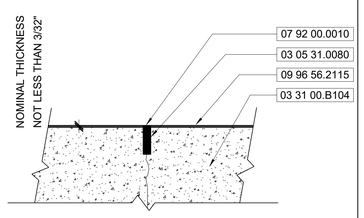
C1 TILE ELASTOMERIC JOINT
6" = 1'-0"



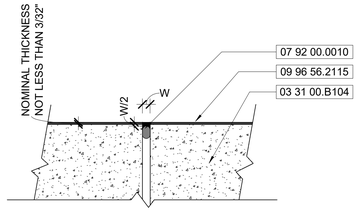
C3 TILE ELASTOMERIC JOINT
6" = 1'-0"



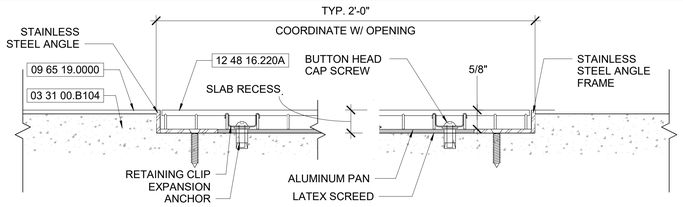
C4 CT1 TO LVT2 TRANSITION
12" = 1'-0"



B2 CONTROL JOINT DETAIL
3" = 1'-0"



B3 SLAB COLD JOINT DETAIL
3" = 1'-0"



B4 ENTRANCE WALK OFF GRILL
6" = 1'-0"

KEYNOTES

NO.	
03 05 31.0080	TYP. SAW CUT CONTROL JOINT.
03 31 00.B104	TYP. 4" STRUCTURAL SLAB-ON-GRADE, SEE STRUCTURAL.
07 92 00.0010	TYP. JOINT SEALANT, CONT.
08 71 00.1713	SADDLE THRESHOLD, SEE SPECIFICATION.
09 05 30.150T	TYP. ALUM. TRIM EXTRUSION FOR PROCELIAN STONE TILE TRANSITION.
09 05 30.150X	TYP. ALUM. EXPANSION TRIM EXTRUSION FOR PROCELIAN STONE TILE.
09 05 30.1513	TYP. PROCELIAN STONE TILE THIN-SET MATERIAL, SEE SPECIFICATIONS.
09 05 65.1961	TYP. PREP SLAB TO RECIVE RESILIENT FLOOR TILE AND TRIM.
09 30 15.5324	TYP. 12" X 24" RECTIFIED, PROCELIAN STONE FLOOR TILING.
09 65 13.330T	TYP. VINYL - RESILIENT TRANSITION ACCESSORY.
09 65 19.0000	TYP. LUXARY VINYL COMPOSITION TILE, SEE SCHEDULE.
09 65 99.550T	TYP. ALUM. TRIM EXTRUSION FOR RESILIENT TILE TRANSITION.
09 65 99.550X	TYP. ALUM. EXPANSION TRIM EXTRUSION FOR RESILIENT TILE TRANSITION.
09 96 56.2115	TYP. TEXTURED EPOXY FLOOR HIGH PERFORMANCE COATING.
12 48 16.220A	TYP. 5/8" SS 304 WALKOFF ENTRY MAT.

SCALE: 3" = 1'-0"
0 1" 2" 4" 8"

SCALE: 6" = 1'-0"
0 1/2"1" 2" 4"

SCALE: 12" = 1'-0"
0 1/4"1/2" 1" 2"

C19-2811- AP
Construction
of Satellite
Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
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SUITE 107
MAITLAND, FL 32751
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407.894.1338 (FAX)
WWW.MLM-MARTIN.COM
AA-C002208
ALM 308 & TYPE PROPERTY
MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	AS NOTED

Drawing Title:

FLOORING DETAILS

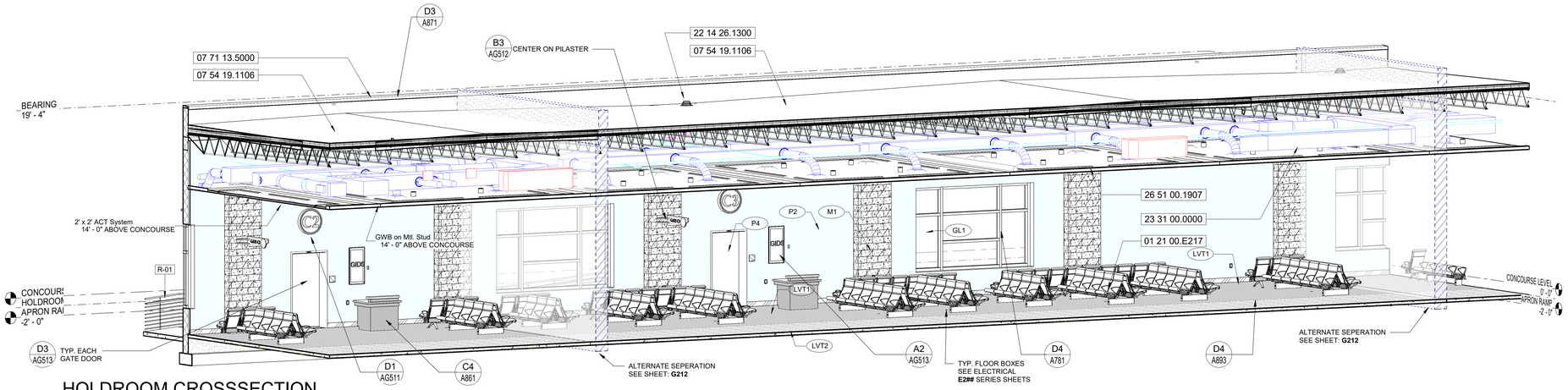
BID DOCUMENTS

Drawing No.:

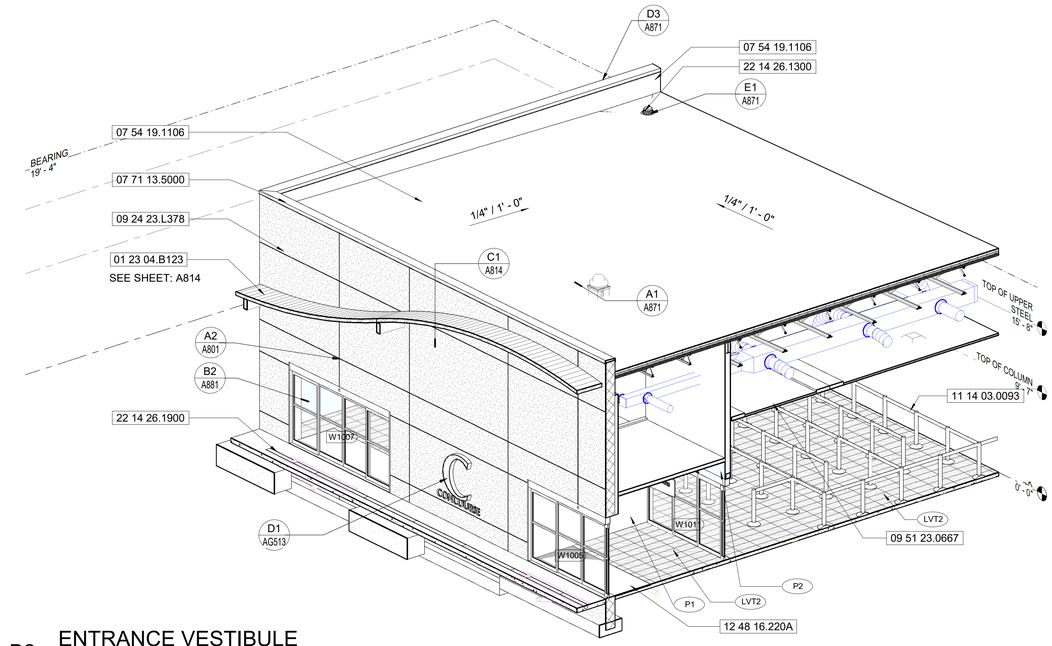
A893

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

12/8/2020 5:49:30 PM



D1 HOLDROOM CROSSSECTION



B2 ENTRANCE VESTIBULE

KEYNOTES

NO.	
01 21 00.E217	TYP. ALLOWANCE FOR FIXED MULTIPLE SEATING WORK.
01 23 04.B123	TYP. ALTERNATE 4 CANOPY CONTRUCTION WORK.
07 54 19.1106	TYP. COLD ADHESIVE APPLIED, 60 MIL PVC MEMBRAINE ROOFING.
07 71 13.5000	TYP. ALUMNINUM MANUFACTURED COPING SYSTEM, INSTALLED PER MNFR. INSTRUCTIONS.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
09 51 23.0667	TYP. STANDARD, 24" X 24" TEGULAR ACOUSITCAL TILE CEILING SYSTEM.
11 14 03.0093	RETRACTABLE BELT STANCHION, NIC.
12 48 16.220A	TYP. 5/8" SS 304 WALKOFF ENTRY MAT.
22 14 26.1300	TYP. FACILITY STORM ROOF DRAIN W/ INTRIGAL OVERFLOW, SEE PLUMBING.
22 14 26.1900	TYP. FACILITY STORM TRENCH DRAIN, SEE PLUMBING.
23 31 00.0000	TYPICAL HVAC DUCTWORK, SEE MECHANICAL
26 51 00.1907	TYP. RECESSED CEILING MOUNTED LINIEAR LED, SEE ELECTRICAL FOR FIXTURE TYPE. PROVIDE FLANGE FOR ACT INSTALL.

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
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MAITLAND, FL 32751
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407.894.1338 (FAX)
WWW.MLM-MARTIN.COM
AA-C002208
MLM JOB # TYPE PROPERTY
MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	NO SCALE

Drawing Title:

PERSPECTIVE BUILDING SECTIONS

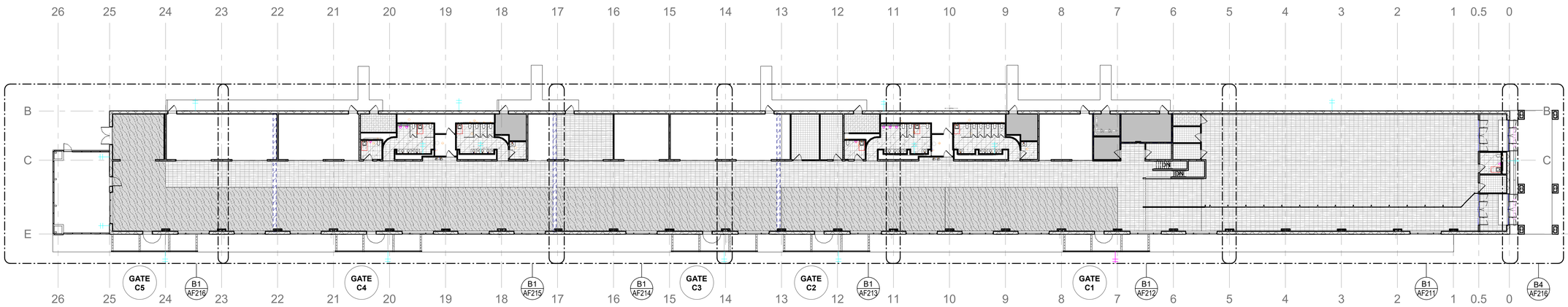
BID DOCUMENTS

Drawing No.:

A901

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

12/8/2020 5:49:48 PM



D1 OVERALL CONCOURSE FINISH PLAN

1" = 20'-0"

NOTES

1. SEE **AF712** FOR FINISH CODE DEFINITIONS
2. SEE **AF21#** SERIES SHEETS FOR LOCATIONS OF FINISHES AND TRANSITIONS
3. FINISH PLANS ARE INTENDED FOR LOCATION OF FINISHES ONLY. ALL OTHER ARCHITECTURAL INFORMATION SEE **A** SERIES DOCUMENTS.
4. TRANSITION DETAILS FOUND **A869** ARE CONSIDERED TYPICAL WETHER IDENTIFIED ON PLAN OR NOT.
5. BASE DETAILS FOUND **A864** ARE CONSIDERED TYPICAL WETHER IDENTIFIED ON PLAN OR NOT.
6. CEILING TRANSITION DETAILS FOUND **A863** ARE CONSIDERED TYPICAL WETHER IDENTIFIED OR NOT.
7. ADDITIONAL WALL FINISH INFORMATION CAN BE FOUND **A51#** SERIES SHEETS

SCALE: 1" = 20'-0"

0 5' 10' 20' 40'

C19-2811- AP
Construction of Satellite Concourse 'C'

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WWW.MLM-MARTIN.COM
AA-C002208
ALM 300 F.T.P.L PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

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Designed By:	**MLM, MAM**
Drawn By:	**ST, CC, DM, CB**
Checked By:	**MAM**
Issue Date:	**30-NOV-2020**
Drawing Scale:	**1" = 20'-0"**

Drawing Title:

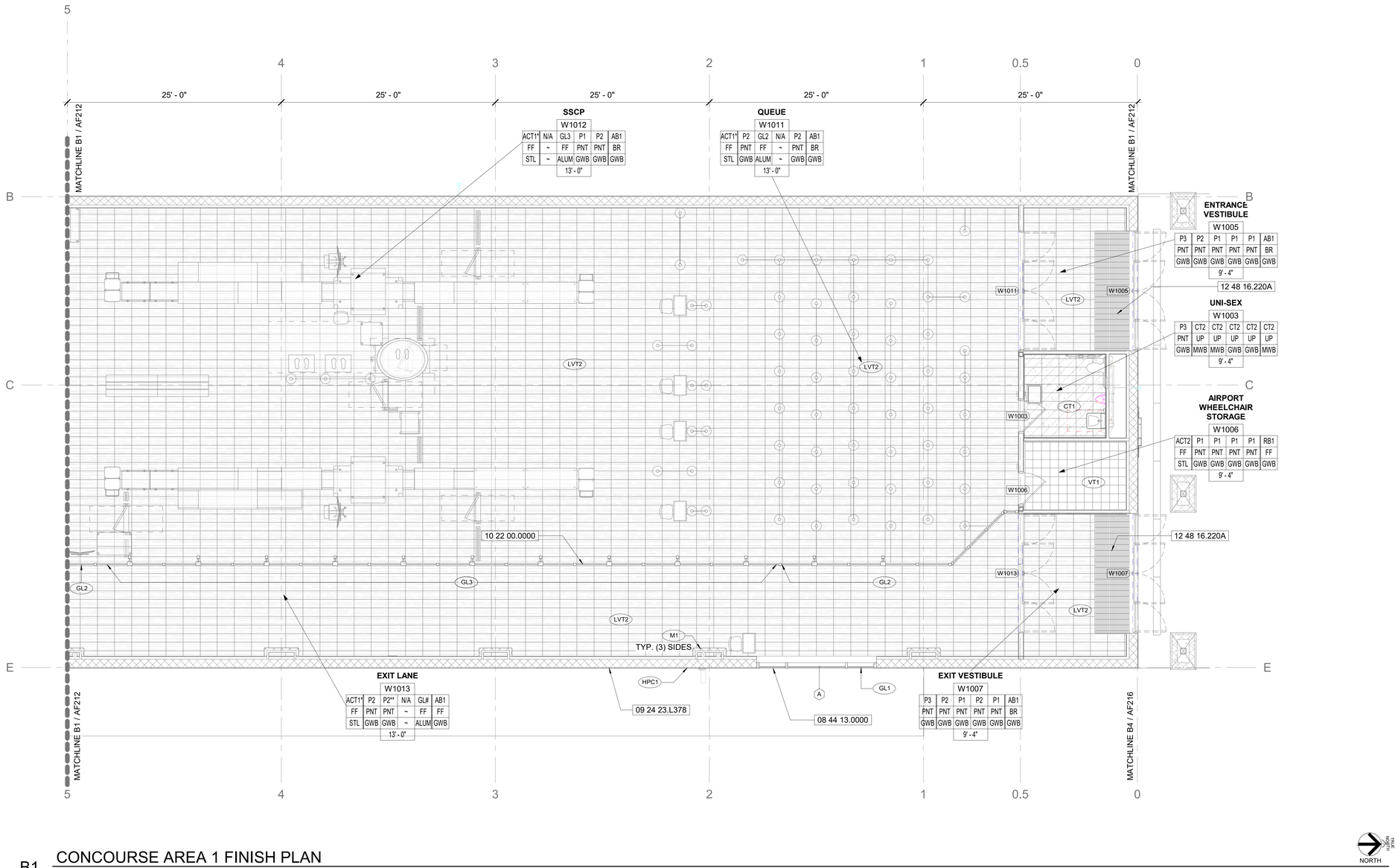
OVERALL FINISH FLOOR PLAN

BID DOCUMENTS

Drawing No.:

AF111

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt
12/8/2020 5:49:57 PM



B1 CONCOURSE AREA 1 FINISH PLAN

3/16" = 1'-0"

KEYNOTES

NO.	
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
10 22 00.0000	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY.
12 48 16.220A	TYP. 5/8" SS 304 WALKOFF ENTRY MAT.

FINISH TAG

Room name

		101			
C	N	E	S	W	B
FC	FN	FE	FS	FW	FB
MC	MN	ME	MS	MW	MB
		HEIGHT			

CEILING, NORTH, EAST, SOUTH, WEST, BASE — WALLS

- 101 — ROOM NUMBER
- C / FC / MC — FINISH CODE
- N / FN / MN — FINISH
- E / FE / ME — SUBSTRATE MATERIAL
- S / FS / MS — AFFECTIVE CEILING HT MEASURED FROM 0'-0" CONCOURSE LEVEL
- W / FW / MW — HEIGHT
- B / FB / MB

NOTES

1. REFER TO **AL641** FOR PARTITION TYPES
2. ALL PARTITIONS ARE DIMENSIONED FROM FACE OF FINISH TO FACE OF FINISH U.O.N.
3. ALL WALL PARTITIONS TO BE FULL HEIGHT U.O.N.
4. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE.
5. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET SERIES **A711**
6. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
7. REFER TO **A** SERIES SHEETS FOR DIMENSIONS
8. AREA DESIGNATED FOR FUTURE WORK (NIC). CONTRACTOR SHALL KEEP THIS AREA CLEAR OF ANY BUILT ELEMENTS ABOVE AND/OR BELOW GROUND UNLESS OTHERWISE NOTED WITHIN THE SCOPE OF THIS PROJECT.
9. CONCESSION AREAS SHALL BE FIT OUT AS SHELL SPACES WITH CODE MINIMUM SYSTEMS SUPPORT AS INDICATED.

FLOORING LEGEND

- ? — MATERIAL CODE SYMBOL: SEE **AF712** FOR DEFINITIONS
- LVT1
- LVT2
- VT1
- VT2
- CT1
- CT2
- P1
- P2
- P3
- HPC2-SAFETY YELLOW
- HPC4-EPOXY
- SEALED CONC
- 1 HR RATED ASSEMBLY
- 2 HR RATED ASSEMBLY

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
SUITE 107
MAITLAND, FL 32751
407.897.6764 (VOICE)
407.894.1338 (FAX)
WWW.MLM-MARTIN.COM
AA-C002208
ULM JOB # TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED FINISH FLOOR PLAN - AREA 1

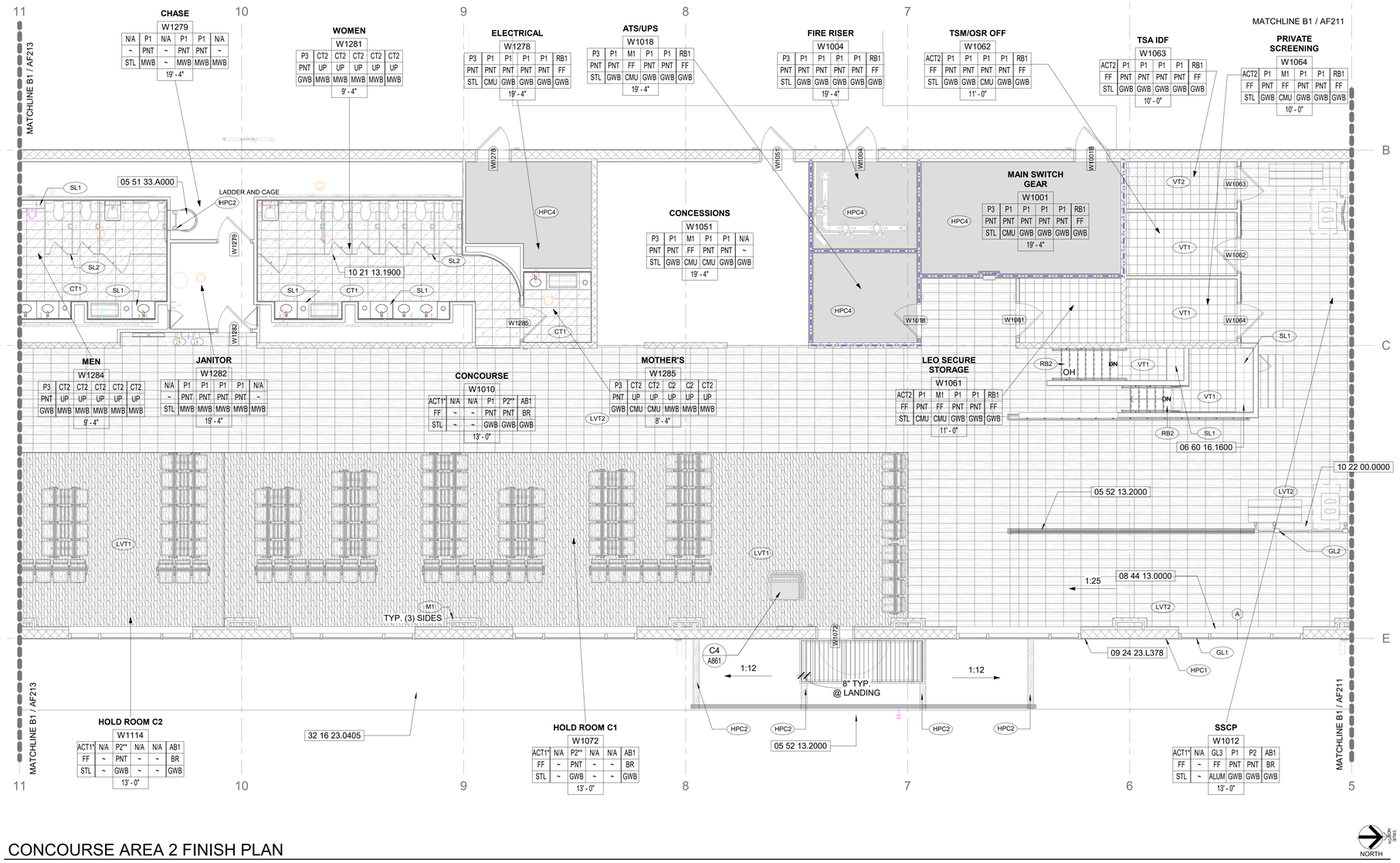
BID DOCUMENTS

Drawing No.:

AF211

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

12/8/2020 5:50:18 PM



B1 CONCOURSE AREA 2 FINISH PLAN

3/16" = 1'-0"

KEYNOTES

NO.	
05 51 33.A000	STEEL ROOF ACCESS LADDER
05 52 13.2000	TYP. STAINLESS STEEL PIPE AND TUBE RAILING.
06 60 16.1600	TYP. SOLID SURFACING COUNTERTOPS.
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
10 21 13.1900	TYP. PLASTIC TOILET COMPARTMENT.
10 22 00.0000	TYP. GLAZED ALUMINUM DEMOUNTABLE WALL ASSEMBLY.
32 16 23.0405	TYP. 4" BROOM FINISHED CONCRETE SIDEWALK.

FINISH TAG

Room name

101 — ROOM NUMBER

C	N	E	S	W	B
FC	FN	FE	FS	FW	FB
MC	MN	ME	MS	MW	MB

FINISH CODE; FINISH; SUBSTRATE MATERIAL

HEIGHT — AFFECTIVE CEILING HT MEASURED FROM 0'-0" CONCOURSE LEVEL

CEILING, NORTH, EAST, SOUTH, WEST, BASE — WALLS

NOTES

1. REFER TO **AL641** FOR PARTITION TYPES
2. ALL PARTITIONS ARE DIMENSIONED FROM FACE OF FINISH TO FACE OF FINISH U.O.N.
3. ALL WALL PARTITIONS TO BE FULL HEIGHT U.O.N.
4. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE.
5. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET SERIES **A711**
6. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
7. REFER TO **A** SERIES SHEETS FOR DIMENSIONS.
8. AREA DESIGNATED FOR FUTURE WORK (NIC). CONTRACTOR SHALL KEEP THIS AREA CLEAR OF ANY BUILT ELEMENTS ABOVE AND/OR BELOW GROUND UNLESS OTHERWISE NOTED WITHIN THE SCOPE OF THIS PROJECT.
9. CONCESSION AREAS SHALL BE FIT OUT AS SHELL SPACES WITH CODE MINIMUM SYSTEMS SUPPORT AS INDICATED.

FLOORING LEGEND

? MATERIAL CODE SYMBOL: SEE **AF712** FOR DEFINITIONS

- LVT1
- LVT2
- VT1
- VT2
- CT1
- CT2
- P1
- P2
- P3
- HPC2-SAFETY YELLOW
- HPC4-EPOXY
- SEALED CONC
- 1 HR RATED ASSEMBLY
- 2 HR RATED ASSEMBLY

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
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AA-C002208
ALM 108 F.S. TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

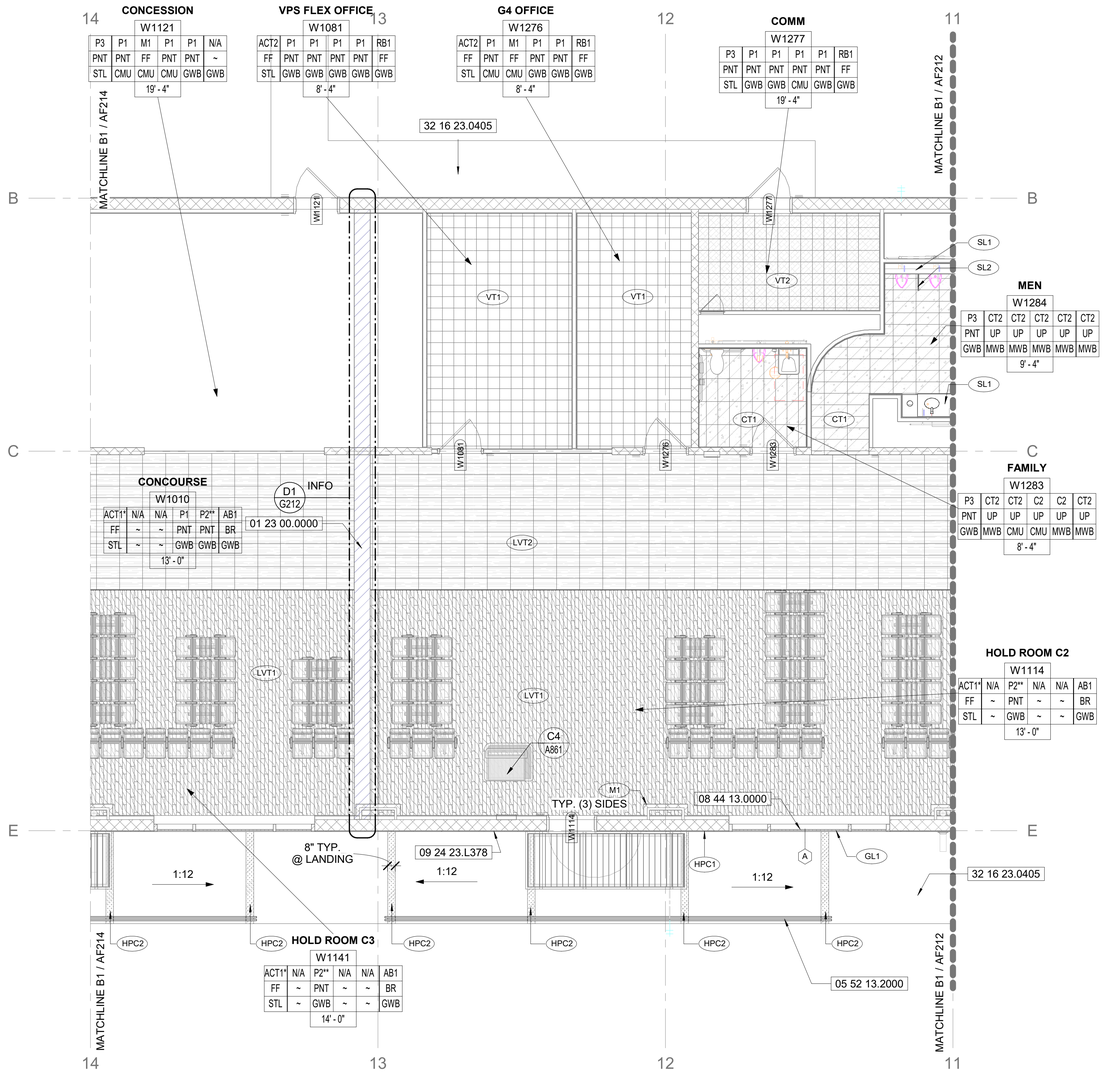
ENLARGED FINISH FLOOR PLAN - AREA 2

BID DOCUMENTS

Drawing No.:

AF212

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt
12/8/2020 5:50:35 PM



B1 CONCOURSE AREA 3 FINISH PLAN

3/16" = 1'-0"

NORTH

KEYNOTES

NO.	
01 23 00.0000	LIMITS OF ALTERNATE WORK, SEE SPECIFICATIONS FOR MORE INFORMATION.
05 52 13.2000	TYP. STAINLESS STEEL PIPE AND TUBE RAILING.
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
32 16 23.0405	TYP. 4" BROOM FINISHED CONCRETE SIDEWALK.

FINISH TAG

Room name

		101			
C	N	E	S	W	B
FC	FN	FE	FS	FW	FB
MC	MN	ME	MS	MW	MB
		HEIGHT			

ROOM NUMBER
FINISH CODE
FINISH
SUBSTRATE MATERIAL
AFFECTIVE CEILING HT MEASURED FROM 0'-0" CONCOURSE LEVEL

CEILING, NORTH, EAST, SOUTH, WEST, BASE — WALLS

NOTES

1. REFER TO **AL641** FOR PARTITION TYPES
2. ALL PARTITIONS ARE DIMENSIONED FROM FACE OF FINISH TO FACE OF FINISH U.O.N.
3. ALL WALL PARTITIONS TO BE FULL HEIGHT U.O.N.
4. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE.
5. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET SERIES **A711**
6. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
7. REFER TO **A** SERIES SHEETS FOR DIMENSIONS
8. AREA DESIGNATED FOR FUTURE WORK (NIC). CONTRACTOR SHALL KEEP THIS AREA CLEAR OF ANY BUILT ELEMENTS ABOVE AND/OR BELOW GROUND UNLESS OTHERWISE NOTED WITHIN THE SCOPE OF THIS PROJECT.
9. CONCESSION AREAS SHALL BE FIT OUT AS SHELL SPACES WITH CODE MINIMUM SYSTEMS SUPPORT AS INDICATED.

FLOORING LEGEND

? MATERIAL CODE SYMBOL: SEE **AF712** FOR DEFINITIONS

- LVT1
- LVT2
- VT1
- VT2
- CT1
- CT2
- P1
- P2
- P3
- HPC2-SAFETY YELLOW
- HPC4-EPOXY
- SEALED CONC
- 1 HR RATED ASSEMBLY
- 2 HR RATED ASSEMBLY

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

C19-2811- AP
Construction of Satellite Concourse 'C'

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AA-C002208
ALM 308 F.T.P.L. PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED FINISH FLOOR PLAN - AREA 3

BID DOCUMENTS

Drawing No.:

AF213

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt
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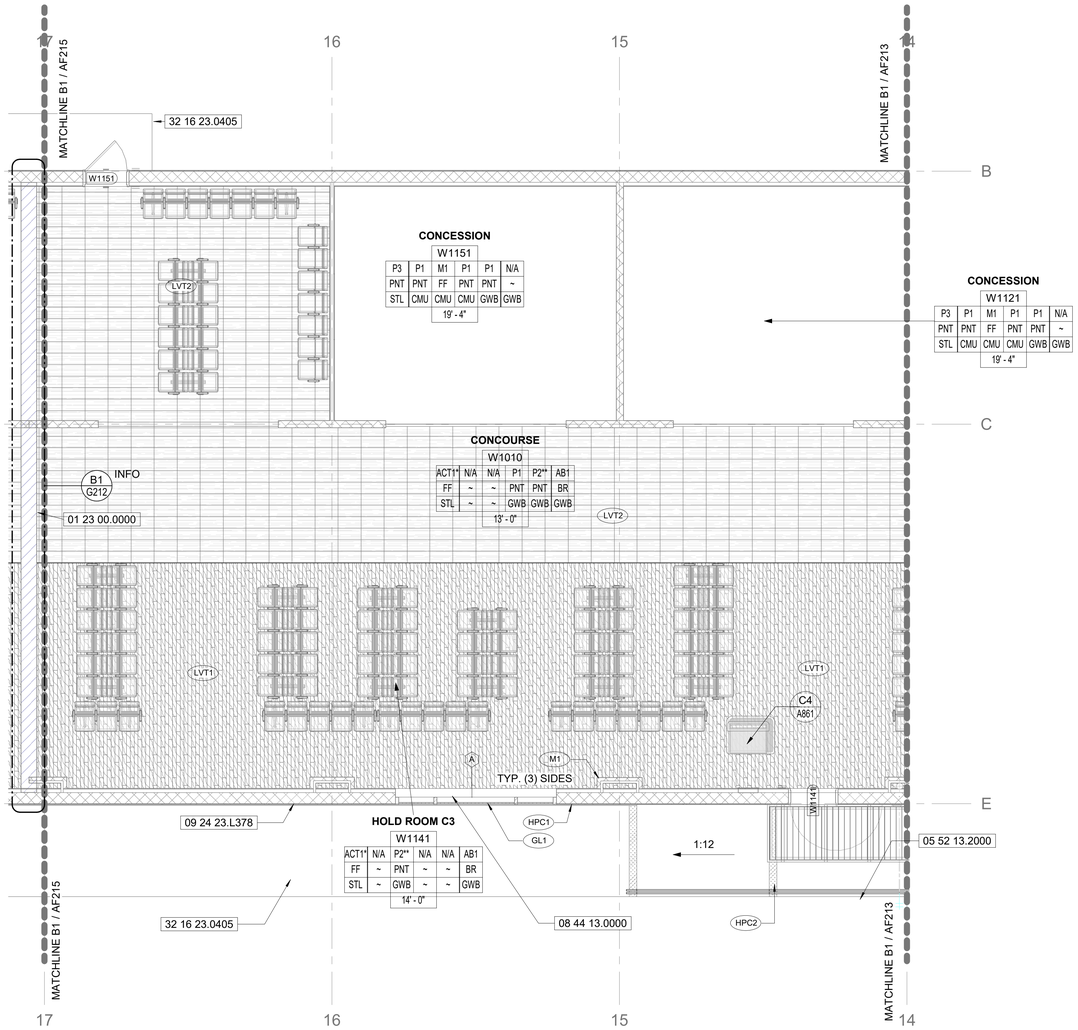

B1 CONCOURSE AREA 4 FINISH PLAN

3/16" = 1'-0"

NORTH

KEYNOTES

NO.	
01 23 00.0000	LIMITS OF ALTERNATE WORK, SEE SPECIFICATIONS FOR MORE INFORMATION.
05 52 13.2000	TYP. STAINLESS STEEL PIPE AND TUBE RAILING.
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
32 16 23.0405	TYP. 4" BROOM FINISHED CONCRETE SIDEWALK.

FINISH TAG

Room name

101 — ROOM NUMBER

C	N	E	S	W	B
FC	FN	FE	FS	FW	FB
MC	MN	ME	MS	MW	MB

FINISH CODE

FINISH

SUBSTRATE MATERIAL

HEIGHT — AFFECTIVE CEILING HT MEASURED FROM 0'-0" CONCOURSE LEVEL

CEILING, NORTH, EAST, SOUTH, WEST, BASE — WALLS

NOTES

1. REFER TO **AL641** FOR PARTITION TYPES
2. ALL PARTITIONS ARE DIMENSIONED FROM FACE OF FINISH TO FACE OF FINISH U.O.N.
3. ALL WALL PARTITIONS TO BE FULL HEIGHT U.O.N.
4. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE.
5. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET SERIES **A711**
6. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
7. REFER TO **A** SERIES SHEETS FOR DIMENSIONS.
8. AREA DESIGNATED FOR FUTURE WORK (NIC). CONTRACTOR SHALL KEEP THIS AREA CLEAR OF ANY BUILT ELEMENTS ABOVE AND/OR BELOW GROUND UNLESS OTHERWISE NOTED WITHIN THE SCOPE OF THIS PROJECT.
9. CONCESSION AREAS SHALL BE FIT OUT AS SHELL SPACES WITH CODE MINIMUM SYSTEMS SUPPORT AS INDICATED.

FLOORING LEGEND

? MATERIAL CODE SYMBOL: SEE **AF712** FOR DEFINITIONS

- LVT1
- LVT2
- VT1
- VT2
- CT1
- CT2
- P1
- P2
- P3
- HPC2-SAFETY YELLOW
- HPC4-EPOXY
- SEALED CONC
- 1 HR RATED ASSEMBLY
- 2 HR RATED ASSEMBLY

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

OKALOOSA COUNTY

FLY VPS

C19-2811- AP Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
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MAITLAND, FL 32751
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WWW.MLM-MARTIN.COM
AA-C002208
MLM JOB #: TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED FINISH FLOOR PLAN - AREA 4

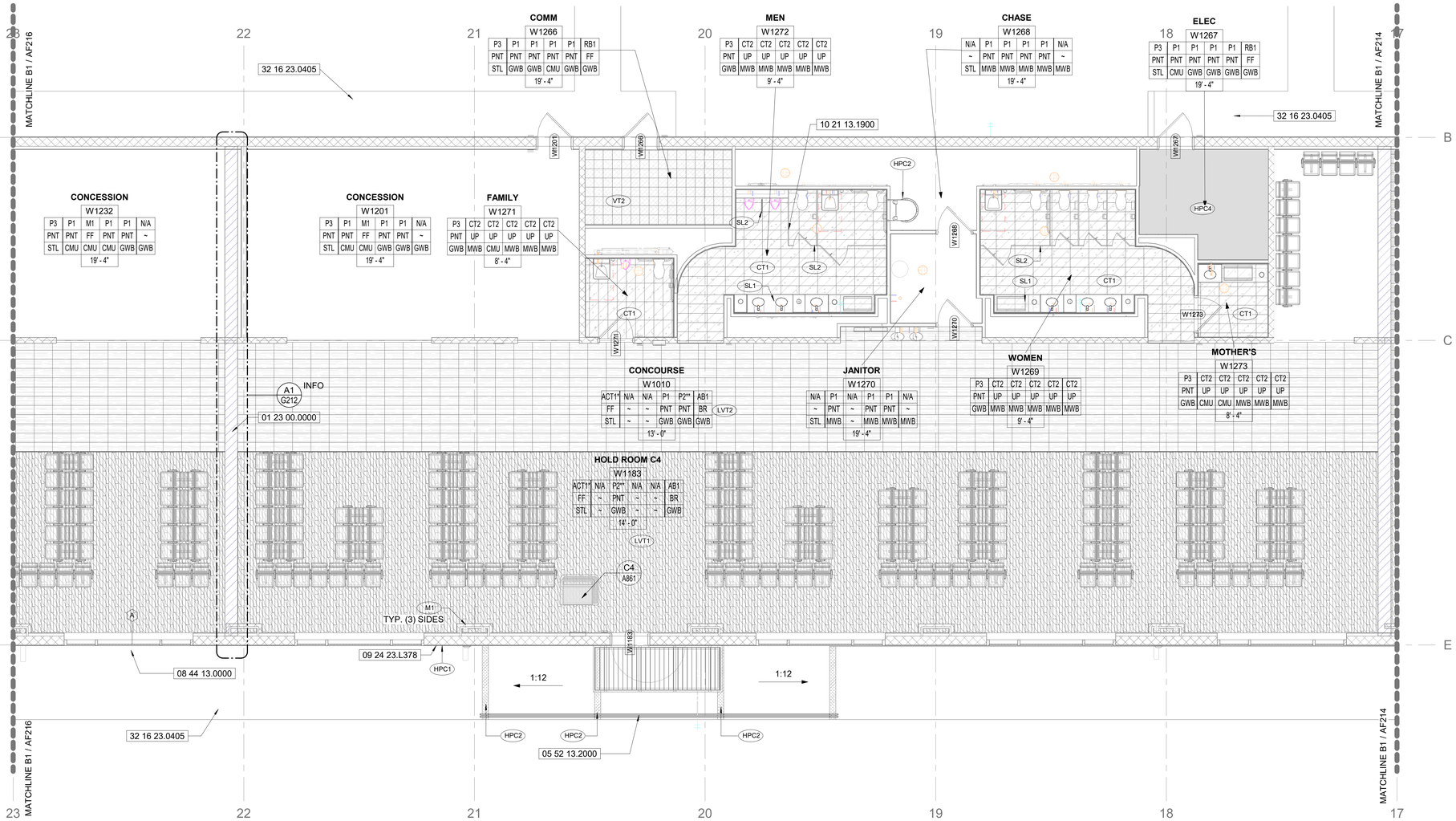
BID DOCUMENTS

Drawing No.:

AF214

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

12/8/2020 5:50:59 PM



B1 CONCOURSE AREA 5 FINISH PLAN

3/16" = 1'-0"

KEYNOTES

NO.	
01 23 00.0000	LIMITS OF ALTERNATE WORK, SEE SPECIFICATIONS FOR MORE INFORMATION.
05 52 13.2000	TYP. STAINLESS STEEL PIPE AND TUBE RAILING.
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
10 21 13.1900	TYP. PLASTIC TOILET COMPARTMENT.
32 16 23.0405	TYP. 4" BROOM FINISHED CONCRETE SIDEWALK.

FINISH TAG

Room name

101 — ROOM NUMBER

C N E S W B — FINISH CODE

FC FN FE FS FW FB — FINISH

MC MN ME MS MW MB — SUBSTRATE MATERIAL

HEIGHT — AFFECTIVE CEILING HT MEASURED FROM 0'-0" CONCOURSE LEVEL

CEILING, NORTH, EAST, SOUTH, WEST, BASE — WALLS

NOTES

1. REFER TO **AL641** FOR PARTITION TYPES
2. ALL PARTITIONS ARE DIMENSIONED FROM FACE OF FINISH TO FACE OF FINISH U.O.N.
3. ALL WALL PARTITIONS TO BE FULL HEIGHT U.O.N.
4. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE.
5. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET SERIES **A711**
6. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
7. REFER TO **A** SERIES SHEETS FOR DIMENSIONS.
8. AREA DESIGNATED FOR FUTURE WORK (NIC). CONTRACTOR SHALL KEEP THIS AREA CLEAR OF ANY BUILT ELEMENTS ABOVE AND/OR BELOW GROUND UNLESS OTHERWISE NOTED WITHIN THE SCOPE OF THIS PROJECT.
9. CONCESSION AREAS SHALL BE FIT OUT AS SHELL SPACES WITH CODE MINIMUM SYSTEMS SUPPORT AS INDICATED.

FLOORING LEGEND

? MATERIAL CODE SYMBOL: SEE **AF712** FOR DEFINITIONS

- LVT1
- LVT2
- VT1
- VT2
- CT1
- CT2
- P1
- P2
- P3
- HPC2-SAFETY YELLOW
- HPC4-EPOXY
- SEALED CONC
- 1 HR RATED ASSEMBLY
- 2 HR RATED ASSEMBLY

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

OKALOOSA COUNTY

FLY VPS

C19-2811- AP Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
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407.897.6764 (VOICE)
407.894.1338 (FAX)
WWW.MLM-MARTIN.COM
AA-C002208
MLM JOB #: TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED FINISH FLOOR PLAN - AREA 5

BID DOCUMENTS

Drawing No.:

AF215

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

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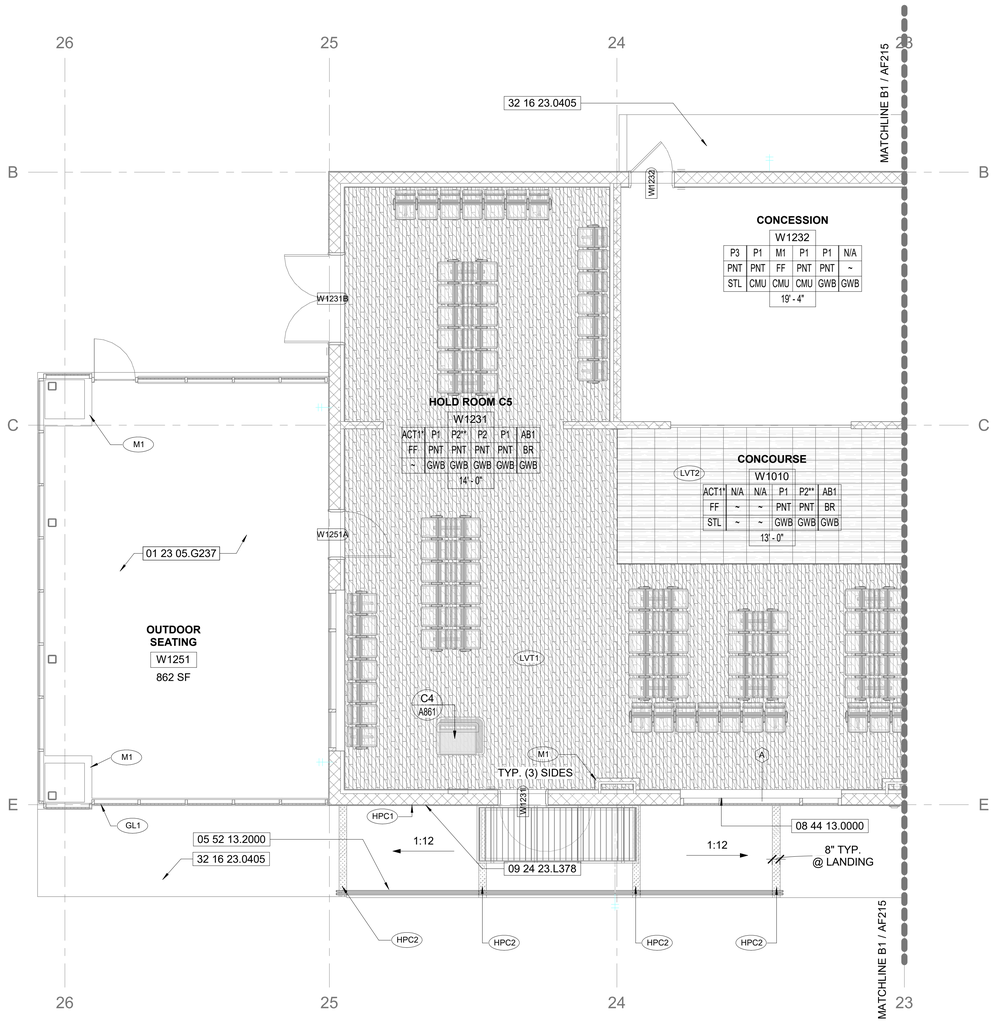
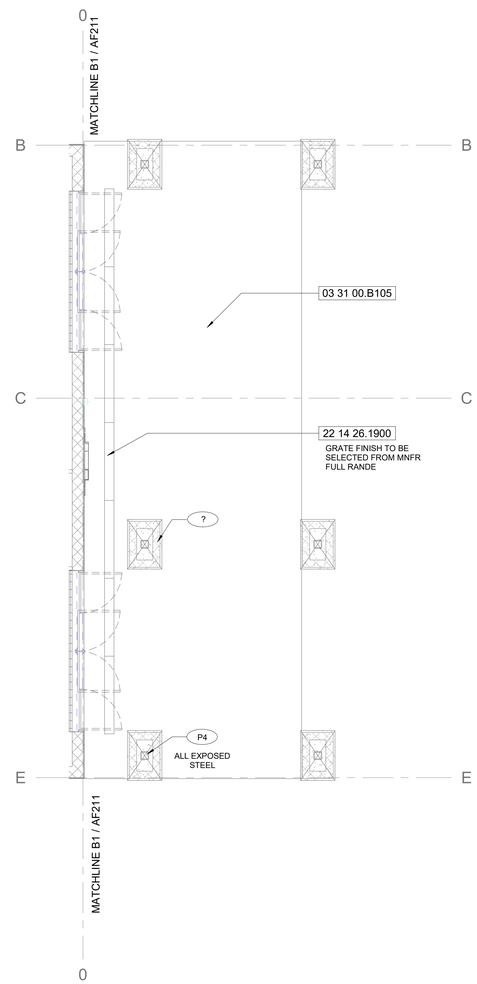


B1 CONCOURSE AREA 6 FINISH PLAN

3/16" = 1'-0"

NORTH



B4 ALTERNATE 4 FINISH PLAN

3/16" = 1'-0"

NORTH

KEYNOTES

NO.	
01 23 05.G237	TYP. ALTERNATE 5 EXTERIOR CONCESSIONS PLAZA WORK.
03 31 00.B105	TYP. 5" CONCRETE FLOOR SLAB, SEE STRUCTURAL
05 52 13.2000	TYP. STAINLESS STEEL PIPE AND TUBE RAILING.
08 44 13.0000	TYP. GLAZED ALUMINUM CUTAIN WALL ASSEMBLY.
09 24 23.L378	TYP. SMOOTH 7/8" STUCCO, 3 COAT SYSTEM
22 14 26.1900	TYP. FACILITY STORM TRENCH DRAIN, SEE PLUMBING.
32 16 23.0405	TYP. 4" BROOM FINISHED CONCRETE SIDEWALK.

FINISH TAG

Room name

101 — ROOM NUMBER

C	N	E	S	W	B
FC	FN	FE	FS	FW	FB
MC	MN	ME	MS	MW	MB

FINISH CODE

FINISH

SUBSTRATE MATERIAL

HEIGHT — AFFECTIVE CEILING HT MEASURED FROM 0'-0" CONCOURSE LEVEL

CEILING, NORTH, EAST, SOUTH, WEST, BASE — WALLS

NOTES

1. REFER TO **AL641** FOR PARTITION TYPES
2. ALL PARTITIONS ARE DIMENSIONED FROM FACE OF FINISH TO FACE OF FINISH U.O.N.
3. ALL WALL PARTITIONS TO BE FULL HEIGHT U.O.N.
4. REFER TO **AG** SERIES SHEETS FOR WAYFINDING AND SIGNAGE.
5. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET SERIES **A711**
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9. CONCESSION AREAS SHALL BE FIT OUT AS SHELL SPACES WITH CODE MINIMUM SYSTEMS SUPPORT AS INDICATED.

FLOORING LEGEND

? MATERIAL CODE SYMBOL: SEE **AF712** FOR DEFINITIONS

- LVT1
- LVT2
- VT1
- VT2
- CT1
- CT2
- P1
- P2
- P3
- HPC2-SAFETY YELLOW
- HPC4-EPOXY
- SEALED CONC
- 1 HR RATED ASSEMBLY
- 2 HR RATED ASSEMBLY

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
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WWW.MLM-MARTIN.COM
AA-C002208
ALM 308-F TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED FINISH FLOOR PLAN - AREA 6

BID DOCUMENTS

Drawing No.:

AF216

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

12/8/2020 5:51:30 PM

ROOM FINISH SCHEDULE

REV	MARK	NUMBER	NAME	FLOOR MATERIAL	FLOOR FINISH	FLOOR CODE	BASE MATERIAL	BASE FINISH	BASE CODE	NORTH WALL MATERIAL	NORTH WALL FINISH	NORTH WALL CODE	EAST WALL MATERIAL	EAST WALL FINISH	EAST WALL CODE	SOUTH WALL MATERIAL	SOUTH WALL FINISH	SOUTH WALL CODE	WEST WALL MATERIAL	WEST WALL FINISH	WEST WALL CODE	CEILING MATERIAL	CEILING FINISH	CEILING CODE	HEIGHT	REMARKS
00_ BASE BID																										
No		W1062	TSM/OSR OFF	CONC	FF	VT1	GWB	FF	RB1	GWB	PNT	P1	GWB	PNT	P1	CMU	PNT	P1	GWB	PNT	P1	STL	FF	ACT2	11' - 0"	
No		W1061	LEO SECURE STORAGE	CONC	FF	VT1	GWB	FF	RB1	CMU	PNT	P1	CMU	FF	M1	GWB	PNT	P1	GWB	PNT	P1	STL	FF	ACT2	11' - 0"	
No		W1063	TSA IDF	CONC	FF	VT2	GWB	FF	RB1	GWB	PNT	P1	GWB	PNT	P1	GWB	PNT	P1	GWB	PNT	P1	STL	FF	ACT2	10' - 0"	
No		W1004	FIRE RISER	CONC	SP	HPC4	GWB	FF	RB1	GWB	PNT	P1	GWB	PNT	P1	GWB	PNT	P1	GWB	PNT	P1	STL	PNT	P3	19' - 4"	
No		W1003	UNI-SEX	CONC	UP	CT1	MWB	UP	CT2	MWB	UP	CT2	MWB	UP	CT2	GWB	UP	CT2	GWB	UP	CT2	GWB	PNT	P3	9' - 4"	
No		W1001	MAIN SWITCH GEAR	CONC	SP	HPC4	GWB	FF	RB1	CMU	PNT	P1	GWB	PNT	P1	GWB	PNT	P1	GWB	PNT	P1	STL	PNT	P3	19' - 4"	
No		W1005	ENTRANCE VESTIBULE	CONC	FF	LVT2	GWB	BR	AB1	GWB	PNT	P2	GWB	PNT	P1	GWB	PNT	P1	GWB	PNT	P1	GWB	PNT	P3	9' - 4"	
No		W1006	AIRPORT WHEELCHAIR STORAGE	CONC	FF	VT1	GWB	FF	RB1	GWB	PNT	P1	GWB	PNT	P1	GWB	PNT	P1	GWB	PNT	P1	STL	FF	ACT2	9' - 4"	
No		W1007	EXIT VESTIBULE	CONC	FF	LVT2	GWB	BR	AB1	GWB	PNT	P2	GWB	PNT	P1	GWB	PNT	P2	GWB	PNT	P1	GWB	PNT	P3	9' - 4"	
No		W1081	VPS FLEX OFFICE	CONC	FF	VT1	GWB	FF	RB1	GWB	PNT	P1	GWB	PNT	P1	GWB	PNT	P1	GWB	PNT	P1	STL	FF	ACT2	8' - 4"	
No		W1051	CONCESSIONS	CONC	~	N/A	GWB	~	N/A	GWB	PNT	P1	CMU	FF	M1	CMU	PNT	P1	GWB	PNT	P1	STL	PNT	P3	19' - 4"	
No		W1064	PRIVATE SCREENING	CONC	FF	VT1	GWB	FF	RB1	GWB	PNT	P1	CMU	FF	M1	GWB	PNT	P1	GWB	PNT	P1	STL	FF	ACT2	10' - 0"	
No		W1072	HOLD ROOM C1	CONC	FF	LVT1	GWB	BR	AB1	~	~	N/A	GWB	PNT	P2**	~	~	N/A	~	~	N/A	STL	FF	ACT1*	13' - 0"	
No		W1114	HOLD ROOM C2	CONC	FF	LVT1	GWB	BR	AB1	~	~	N/A	GWB	PNT	P2**	~	~	N/A	~	~	N/A	STL	FF	ACT1*	13' - 0"	
No		W1010	CONCOURSE	CONC	FF	LVT2	GWB	BR	AB1	~	~	N/A	~	~	N/A	GWB	PNT	P1	GWB	PNT	P2**	STL	FF	ACT1*	13' - 0"	
No		W1012	SSCP	CONC	FF	LVT2	GWB	BR	AB1	~	~	N/A	ALUM	FF	GL3	GWB	PNT	P1	GWB	PNT	P2	STL	FF	ACT1*	13' - 0"	
No		W1011	QUEUE	CONC	FF	LVT2	GWB	BR	AB1	GWB	PNT	P2	ALUM	FF	GL2	~	~	N/A	GWB	PNT	P2	STL	FF	ACT1*	13' - 0"	
No		W1013	EXIT LANE	CONC	FF	LVT2	GWB	FF	AB1	GWB	PNT	P2	GWB	PNT	P2**	~	~	N/A	ALUM	FF	GL#	STL	FF	ACT1*	13' - 0"	
No		W1018	ATS/UPS	CONC	SP	HPC4	GWB	FF	RB1	GWB	PNT	P1	CMU	FF	M1	GWB	PNT	P1	GWB	PNT	P1	STL	PNT	P3	19' - 4"	
No		W1276	G4 OFFICE	CONC	FF	VT1	GWB	FF	RB1	CMU	PNT	P1	CMU	FF	M1	GWB	PNT	P1	GWB	PNT	P1	STL	FF	ACT2	8' - 4"	
No		W1277	COMM	CONC	FF	VT2	GWB	FF	RB1	GWB	PNT	P1	GWB	PNT	P1	CMU	PNT	P1	GWB	PNT	P1	STL	PNT	P3	19' - 4"	
No		W1278	ELECTRICAL	CONC	SP	HPC4	GWB	FF	RB1	CMU	PNT	P1	GWB	PNT	P1	GWB	PNT	P1	GWB	PNT	P1	STL	PNT	P3	19' - 4"	
No		W1279	CHASE	CONC	~	N/A	MWB	~	N/A	MWB	PNT	P1	~	~	N/A	MWB	PNT	P1	MWB	PNT	P1	STL	~	N/A	19' - 4"	PAINT LADDER SAFETY YELLOW
No		W1281	WOMEN	CONC	UP	CT1	MWB	UP	CT2	MWB	UP	CT2	MWB	UP	CT2	MWB	UP	CT2	MWB	UP	CT2	GWB	PNT	P3	9' - 4"	GT1 @ CURVED WALL
No		W1282	JANITOR	CONC	~	N/A	MWB	~	N/A	MWB	PNT	P1	MWB	PNT	P1	MWB	PNT	P1	MWB	PNT	P1	STL	~	N/A	19' - 4"	
No		W1283	FAMILY	CONC	UP	CT1	MWB	UP	CT2	MWB	UP	CT2	CMU	UP	CT2	CMU	UP	C2	MWB	UP	C2	GWB	PNT	P3	8' - 4"	
No		W1284	MEN	CONC	UP	CT1	MWB	UP	CT2	MWB	UP	CT2	MWB	UP	CT2	MWB	UP	CT2	MWB	UP	CT2	GWB	PNT	P3	9' - 4"	GT2 @ CURVED WALL
No		W1285	MOTHER'S	CONC	UP	CT1	MWB	UP	CT2	CMU	UP	CT2	CMU	UP	CT2	MWB	UP	C2	MWB	UP	C2	GWB	PNT	P3	8' - 4"	
No		W1286	CHASE	CONC	~	N/A	~	~	N/A	~	~	N/A	CMU	~	N/A	~	~	N/A	~	~	N/A	STL	~	N/A	19' - 4"	
No		W1287	CHASE	CONC	~	N/A	~	~	N/A	~	~	N/A	CMU	~	N/A	~	~	N/A	~	~	N/A	STL	~	N/A	19' - 4"	
01_ Alternate 1																										
No		W1151	CONCESSION	CONC	~	N/A	GWB	~	N/A	CMU	PNT	P1	CMU	FF	M1	CMU	PNT	P1	GWB	PNT	P1	STL	PNT	P3	19' - 4"	
No		W1121	CONCESSION	CONC	~	N/A	GWB	~	N/A	CMU	PNT	P1	CMU	FF	M1	CMU	PNT	P1	GWB	PNT	P1	STL	PNT	P3	19' - 4"	
No		W1141	HOLD ROOM C3	CONC	FF	LVT1	GWB	BR	AB1	~	~	N/A	GWB	PNT	P2**	~	~	N/A	~	~	N/A	STL	FF	ACT1*	14' - 0"	
02_ Alternate 2																										
No		W1201	CONCESSION	CONC	~	N/A	GWB	~	N/A	CMU	PNT	P1	CMU	FF	M1	GWB	PNT	P1	GWB	PNT	P1	STL	PNT	P3	19' - 4"	
No		W1183	HOLD ROOM C4	CONC	FF	LVT1	GWB	BR	AB1	~	~	N/A	GWB	PNT	P2**	~	~	N/A	~	~	N/A	STL	FF	ACT1*	14' - 0"	
No		W1266	COMM	CONC	FF	VT2	GWB	FF	RB1	GWB	PNT	P1	GWB	PNT	P1	CMU	PNT	P1	GWB	PNT	P1	STL	PNT	P3	19' - 4"	
No		W1267	ELEC	CONC	SP	HPC4	GWB	FF	RB1	CMU	PNT	P1	GWB	PNT	P1	GWB	PNT	P1	GWB	PNT	P1	STL	PNT	P3	19' - 4"	
No		W1268	CHASE	CONC	~	N/A	MWB	~	N/A	MWB	PNT	P1	MWB	PNT	P1	MWB	PNT	P1	MWB	PNT	P1	STL	~	N/A	19' - 4"	
No		W1269	WOMEN	CONC	UP	CT1	MWB	UP	CT2	MWB	UP	CT2	MWB	UP	CT2	MWB	UP	CT2	MWB	UP	CT2	GWB	PNT	P3	9' - 4"	GT1 @ CURVED WALL
No		W1270	JANITOR	CONC	~	N/A	MWB	~	N/A	MWB	PNT	P1	~	~	N/A	MWB	PNT	P1	MWB	PNT	P1	STL	~	N/A	19' - 4"	PAINT LADDER SAFETY YELLOW
No		W1271	FAMILY	CONC	UP	CT1	MWB	UP	CT2	MWB	UP	CT2	CMU	UP	CT2	MWB	UP	CT2	MWB	UP	CT2	GWB	PNT	P3	8' - 4"	
No		W1272	MEN	CONC	UP	CT1	MWB	UP	CT2	MWB	UP	CT2	MWB	UP	CT2	MWB	UP	CT2	MWB	UP	CT2	GWB	PNT	P3	9' - 4"	GT2 @ CURVED WALL
No		W1273	MOTHER'S	CONC	UP	CT1	MWB	UP	CT2	CMU	UP	CT2	CMU	UP	CT2	MWB	UP	CT2	MWB	UP	CT2	GWB	PNT	P3	8' - 4"	
No		W1274	CHASE	CONC	~	N/A	~	~	N/A	~	~	N/A	CMU	~	N/A	~	~	N/A	~	~	N/A	STL	~	N/A	19' - 4"	
No		W1275	CHASE	CONC	~	N/A	~	~	N/A	~	~	N/A	CMU	~	N/A	~	~	N/A	~	~	N/A	STL	~	N/A	19' - 4"	
03_ Alternate 3																										
No		W1232	CONCESSION	CONC	~	N/A	GWB	~	N/A	CMU	PNT	P1	CMU	FF	M1	CMU	PNT	P1	GWB	PNT	P1	STL	PNT	P3	19' - 4"	
No		W1231	HOLD ROOM C5	CONC	FF	LVT1	GWB	BR	AB1	GWB	PNT	P1	GWB	PNT	P2**	GWB	PNT	P2	GWB	PNT	P1	~	FF	ACT1*	14' - 0"	
05_ Alternate 5																										
No		W1251	OUTDOOR SEATING	CONC	~	N/A	~	~	N/A	~	~	N/A	ALUM	FF	GL1	ALUM	FF	GL1	ALUM	FF	GL1	~	~	N/A		TENSION FABRIC

NOTICE:
SCHEDULE(S) REVISED
WHEN THIS AREA IS CLOUDED

ADDITIONAL REMARKS

P2** BURNISHED (GRF) MASONRY EXISTS AS COMPONENT OF WALL. DO NOT PAINT BURNISHED (GRF) BLOCK.

ACT1* SUSPENDED GWB CEILING ASSEMBLIES EXIST AS COMPONENT OF CEILING. DO NOT PAINT ACT1 HOWEVER PROVIDE P3 FINISH TO SUSPENDED GWB CEILING ASSEMBLY.

GL# GLAZING APPLICATIONS VARY, SEE ELEVATIONS FOR GL TYPES.

FINISH

BR BRUSHED ALUMINUM

FF FACTORY FINISH

PNT PAINT FINISH, SEE FINISH CODE FOR MORE INFO.

SP SAND (ABRASIVE) BRODCAST ON ROLLED EPOXY RESIN.

UP UNPOLISHED FINISH.

SUBSTRATE MATERIAL

CMU CONCRETE UNIT MASONRY

CONC CAST CONCRETE

GWB TYPE 'X' GYPSUM WALL BOARD

MWB MOISTURE RESISTANT/ TILE BACKER WALL BOARD.

STL EXPOSED STRUCTURAL STEEL/DECK.

NOTES

1. ALL HOLLOW METAL DOORS AND FRAMES SHALL BE PAINTED **P4** UON.
2. WITHIN ELECTRICAL ROOMS; ALL OUSEKEEPING PADS SHALL BE PAINTED "SAFETY RED" **HPC3.**
3. SEE **AF712** FOR FINISH CODE DEFINITIONS.

C19-2811- AP
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AA-C002208
MLM-MARTIN ARCHITECTS, INC.
MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	NO SCALE

Drawing Title:

ROOM FINISH SCHEDULE

BID DOCUMENTS

Drawing No.:

AF711

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LVT1

Specification §09 65 19

Basis of design
Manufacture: Armstrong
Line: Natural Creations - ArborArt
Color: NA180 | Galena Oak - rye
Format: 6" x 48"
Pattern: Offset "Plank"

Contact: William Wise
(803) 728-7077
wiwise@armstrongflooring.com

LVT2

Specification §09 65 19

Basis of design
Manufacture: Armstrong
Line: Natural Creations - EarthCuts
Color: NA340 | Delano - shell
Format: 12" x 24"
Pattern: Stack

Contact: William Wise
(803) 728-7077
wiwise@armstrongflooring.com

GT1

Specification §09 30 00

Basis of design
Manufacture: Crossville
Line: GLASS BLOX
Color: GB05/.10101 | Moonbeam / Clear sky / Aquaglem
Format: 1" x 1" on 12" x 12" sheet

Contact: Andy Shodis
(321) 229-3252
ashodis@crossvillestudios.com

Alternate 7
Utilize CT2

GT2

Specification §09 30 00

Basis of design
Manufacture: Crossville
Line: GLASS BLOX
Color: GB06/.10101 | Angel Fish / South Sea / Glacier
Format: 1" x 1" on 12" x 12" sheet

Contact: Andy Shodis
(321) 229-3252
ashodis@crossvillestudios.com

Alternate 7
Utilize CT2

CT1

Specification §09 30 00

Basis of design
Manufacture: Crossville
Line: Alaska
Color: ASK02 | Bone
Format: 12" x 24"
Pattern: Rectified Stack Bond

Contact: Andy Shodis
(321) 229-3252
ashodis@crossvillestudios.com

CT2

Specification §09 30 00

Basis of design
Manufacture: Crossville
Line: Retro Active 2.0
Color: RET04 | Empress White UPS
Format: 12" x 24"
Pattern: Rectified Stack Bond

Contact: Andy Shodis
(321) 229-3252
ashodis@crossvillestudios.com

P1

Specification §09 91 00

Basis of design
Manufacture: Sherwin Williams
Color: SW-7005 | "Pure White"
Finish: Eggshell Finish

Contact: Christopher Olden, CSI, CDT
Architectural Account Executive
1-800-4Sherwin
chris.m.olden@sherwin.com

P2

Specification §09 91 00

Basis of design
Manufacture: Sherwin Williams
Color: SW-6477 | "Tide Water"
Finish: Eggshell Finish

Contact: Christopher Olden, CSI, CDT
Architectural Account Executive
1-800-4Sherwin
chris.m.olden@sherwin.com

P3

Specification §09 91 00

Basis of design
Manufacture: Sherwin Williams
Color: SW-7007 | "Ceiling Bright White"
Finish: Eggshell Finish

Contact: Christopher Olden, CSI, CDT
Architectural Account Executive
1-800-4Sherwin
chris.m.olden@sherwin.com

P4

Specification §09 91 00

Basis of design
Manufacture: Sherwin Williams
Color: SW-7005 | "Pure White"
Finish: Semi-Gloss Finish

Contact: Christopher Olden, CSI, CDT
Architectural Account Executive
1-800-4Sherwin
chris.m.olden@sherwin.com

P5

Specification §09 91 00

Basis of design
Manufacture: Sherwin Williams
Color: "BLACK"
Finish: FLAT

Contact: Christopher Olden, CSI, CDT
Architectural Account Executive
1-800-4Sherwin
chris.m.olden@sherwin.com

ACT1

Specification §09 51 13

Basis of design
Manufacture: Armstrong Ceiling Solutions
Line: Ultima 1911 BT 15/16
Color: White
Format: 24" x 24" x 3/4"
Pattern: N/A
NRC 0.75
CAC 35 MIN.

Contact: Jonathan Elrod
(407) 803-3448
jelrod@armstrongceilings.com

Alternate 6
Line: Calla 8880 T 15/16
Color: White
Format: 24" x 24" x 1 3/4"
Pattern: N/A
NRC 0.80
CAC 50 MIN.

HPC1

Specification §09 91 00

Basis of design
Manufacture: Sherwin Williams
Color: SW-7005 | "Pure White"

Contact: Christopher Olden, CSI, CDT
Architectural Account Executive
1-800-4Sherwin
chris.m.olden@sherwin.com

HPC2

Specification §09 91 00

Basis of design
Manufacture: Sherwin Williams
Color: SW-4081 | "Safety Yellow"

Contact: Christopher Olden, CSI, CDT
Architectural Account Executive
1-800-4Sherwin
chris.m.olden@sherwin.com

HPC3

Specification §09 91 00

Basis of design
Manufacture: Sherwin Williams
Color: SW-4081 | "Safety Red"

Contact: Christopher Olden, CSI, CDT
Architectural Account Executive
1-800-4Sherwin
chris.m.olden@sherwin.com

HPC4

Specification §09 91 00

Basis of design
Manufacture: Sherwin Williams
Color: "Grey"

Contact: Christopher Olden, CSI, CDT
Architectural Account Executive
1-800-4Sherwin
chris.m.olden@sherwin.com

ACT2

Specification §09 51 13

Basis of design
Manufacture: Armstrong Ceiling Solutions
Line: Cortega 824 SQ
Color: White
Format: 24" x 24" x 5/8"
Pattern: N/A
NRC 0.55
CAC 35 Min.

Contact: Jonathan Elrod
(407) 803-3448
jelrod@armstrongceilings.com

PL1

Specification §06 22 00

Basis of design
Manufacture: Wilsonart
Line: Wilsonart Standard Commercial
Color: "8220-38 French Pear"
Finish: Plastic Laminate

Contact: www.wilsonart.com
1-800-433-3222

PL2

Specification §06 22 00

Basis of design
Manufacture: Wilsonart
Line: Wilsonart Standard Commercial
Color: "White Melamine"
Finish: Interior of shelves/drawers

Contact: www.wilsonart.com
1-800-433-3222

GL1

Specification §08 80 00

Basis of design
Manufacture: VIRACON
Color: VNE6-63 GREEN
Format: 1 - 5/16" IGU
Pattern: NONE

Contact: Jeff Rigot
Architectural Sales
239-872-2525
jrigot@viracon.com

GL2

Specification §08 80 00

Basis of design
Manufacture: VIRACON
Color: CLEAR
Format: 1/4" TEMPERED
Pattern: APPLIED OPAQUE SECURITY FILM (3M)

Contact: Jeff Rigot
Architectural Sales
239-872-2525
jrigot@viracon.com

GL3

Specification §08 80 00

Basis of design
Manufacture: VIRACON
Color: CLEAR
Format: 1/4" TEMPERED
Pattern: NONE

Contact: Jeff Rigot
Architectural Sales
239-872-2525
jrigot@viracon.com

AL1

Specification §08

Basis of design
Manufacture: YKK AP
Color: YS1N | CLEAR ANODIZED PLUS

Contact:

PF

POLYVINYLIDENE FLUORIDE - "KYNAR"

Basis of design - ARCHITECTS SAMPLE TO MATCH
Manufacture: IMETCO
Color: EMERALD GREEN - STANDARD COLOR

Contact: 800-646-3826

RB1

Specification §09 65 19

Basis of design
Manufacture: Armstrong
Line: Flooring
Color: V6860 | Jet Black
Format: 6" - Roll
Pattern: Cove

Contact: William Wise
(803) 728-7077
wiwise@armstrongflooring.com

RB2

Specification §09 65 19

Basis of design
Manufacture: Armstrong
Line: CONTNUUM Flooring
Color: R4560 | Jet Black
Format: 48" x 13"
Pattern: Tread

Contact: William Wise
(803) 728-7077
wiwise@armstrongflooring.com

RB3

Specification §09 65 19

Basis of design
Manufacture: Armstrong
Line: CONTNUUM Flooring
Color: R4F60 | Jet Black
Format: 48" x 7"
Pattern: Riser

Contact: William Wise
(803) 728-7077
wiwise@armstrongflooring.com

VT1

Specification §09 65 19

Basis of design
Manufacture: Armstrong
Line: Standard Excelon Imperial Texture
Color: 59234 | Silk
Format: 12" x 12"
Pattern: Stack

Contact: William Wise
(803) 728-7077
wiwise@armstrongflooring.com

VT2

Specification §09 65 19

Basis of design
Manufacture: Armstrong
Line: Excelon SDT
Color: 51953 | Pearl White
Format: 12" x 12"
Pattern: Stack

Contact: William Wise
(803) 728-7077
wiwise@armstrongflooring.com

SL1

Specification §06 60 16

Basis of design
Manufacture: Dupont Corian
Line: 13770-82363
Color: "Cottage Lane"
Finish: Solid Surface

Contact: H.J. Oldenkamp Co. (South)
1-800-756-4996
www.Oldenkamp.com

SL2

Specification §10 21 13.19

Basis of design
Manufacture: Scranton Products
Line: Standard
Color: "Linen Orange Peel"
Finish: Restroom Partitions

Contact: Tammy@stambone.com
1-863-646-6445 (rep)
www.scrantonproducts.com
1-800-445-5148

AB1

Specification §09 29 19

Basis of design
Manufacture: Fry Reglet
Line: DRMB
Color: Mill/Brushed
Format: 6" x 48"
Pattern: BUTT

Contact:

M1

Specification §04 22 00

Basis of design
Manufacture: TBD
Line: GRF
Color: TBD
Format: 8" x 16" NOM.
Pattern: Running Bond

Contact:

PCL

Specification §04 22 00

Basis of design
Manufacture: TBD
Line: Sand Finish
Color: TBD

Contact:

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
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WWW.MLM-MARTIN.COM
AA-C002208
MLM JOB # TYPE PROPERTY
MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	NO SCALE

Drawing Title:

FINISH CODE SCHEDULE

BID DOCUMENTS

Drawing No.:

AF712

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

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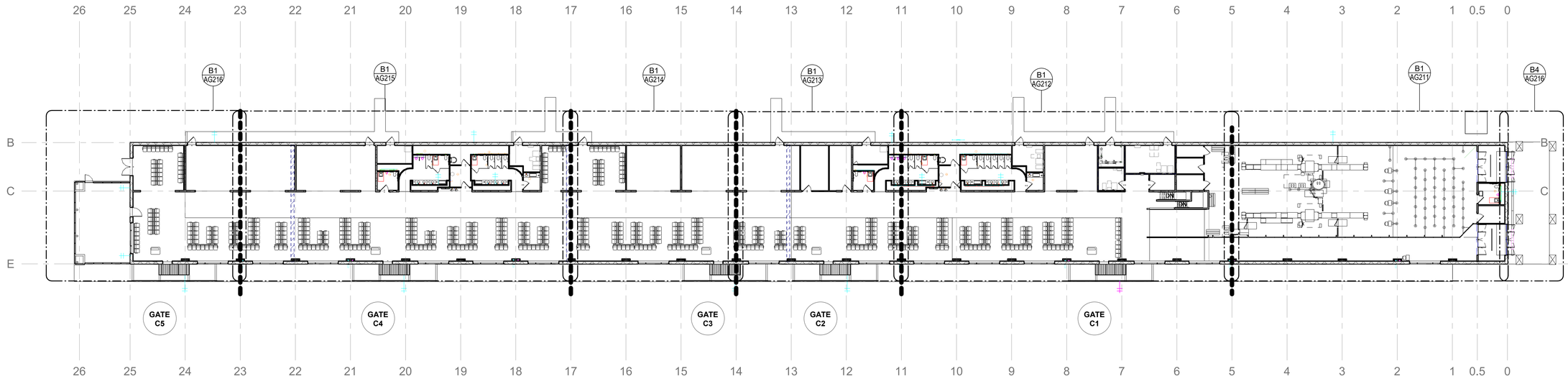

D1 OVERALL CONCOURSE SIGNAGE PLAN

1" = 20'-0"

NORTH

ABCDEFGHIJKLMNOPQR STUVWXYZ0123456789

FRUTIGER BOLD

ABCDEFGHIJKLMNOPQR STUVWXYZ0123456789

OTTAWA REGULAR

ABCDEFGHIJKLMNOPQR STUVWXYZ0123456789

OTTAWA BOLD

SCALE: 1" = 20'-0"

0 5' 10' 20' 40'

OKALOOSA COUNTY

FLY VPS

C19-2811- AP Construction of Satellite Concourse 'C'

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MLM JOB #: TYPE PROPERTY

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FL AR-98279

SEAL

Revisions

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Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	1" = 20'-0"

Drawing Title:

OVERALL SIGNAGE FLOOR PLAN

BID DOCUMENTS

Drawing No.:

AG111

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

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MATERIALS

A. Aluminum:
1. Provide durable, high-grade aluminum of alloy and temper as best suited to furnish the strength, performance, and finish required. Provide all plate, sheet, castings, hardware, and all other aluminum sign components as required. Indicate the alloys to be used on the Shop Drawings.

B. Aluminum Extrusions:
1. Provide all standard and custom extruded aluminum sign components as required.
2. Prior to the start of fabrication, provide extrusion manufacturer information for review by the Designer and the Owner.
3. Aluminum extrusions shall be durable, high-grade aluminum of alloy and temper as best suited to furnish the strength, performance, and finish required. Indicate the alloys to be used on the Shop Drawings.
4. All extrusions shall be professionally structurally engineered to provide the performance required.
5. Provide profile review drawings and sample sections of all extrusions for review by the Designer and the Owner prior to final production.

C. Steel:
1. Provide durable, high-grade steel of alloy and temper as best suited to furnish the strength, performance, and finish required. Provide all steel sheets, channels, shapes, and other steel sign components as required. Indicate the alloys and types of steel to be used in the Shop Drawings.
2. Stainless steel: Type 316
3. Galvanized steel:
   a. Provide hot-dip galvanized sign supports, hardware, and components as required.
   b. Galvanize steel using the hot-dip process.
   c. Meet all the requirements of all applicable ASTM specifications, standards, guidelines, requirements, and performance criteria for zinc (hot-dip galvanized) coatings on iron and steel sign supports, hardware, and components.
   d. Dissimilar material: Isolate dissimilar materials from direct contact.

D. Unfinished Threaded Fasteners:
1. ASTM A 300 Series Grade A non-magnetic stainless steel.
2. Vandal-resistant and tamper-resistant screws shall be stainless steel drilled spanner drive screws, or equal as reviewed and accepted by the Owner.
3. All hardware shall be non-magnetic stainless steel, or other accepted, non-magnetic, long lasting, corrosion-resistant material.

B. Mounting Hardware:
1. Provide all mounting hardware and materials required to properly, safely, and securely mount the wayfinding signs and the wayfinding sign components. All hardware shall be high quality, long lasting, vandal-resistant, tamper-resistant, and corrosion-resistant.
2. No hardware shall be visible on the wayfinding sign faces unless indicated in the Drawings.

C. Acrylic Sheet:
1. Provide scratch-resistant and UV-resistant clear and translucent acrylic sheets as required.
2. Acceptable acrylic sheeting includes: Plexiglas Acrylic Sheet by Altuglas International/Arkema Inc., 2000 Market Street, Philadelphia, PA 19103, Telephone: 1-800-523-1532, or approved substitution acrylic sheeting accepted by the Designer and the Owner.
3. 1/4" thickness, not less than 1/4" thick.

D. Polycarbonate Sheet:
1. Provide scratch-resistant and UV-resistant clear and translucent polycarbonate sheets as required.
2. Acceptable polycarbonate sheeting includes: Lexan MR10 Sheet with Margard coating by Sabic Innovative Plastics, One Plastics Avenue, Pittsfield, MA 01201, Telephone: 413-448-7110, or approved substitution scratch-resistant and UV-resistant polycarbonate sheeting accepted by the Owner.
3. The thickness of material shall be determined by the Contractor, subject to review by the Designer and the Owner. Thickness not less than 1/4".

E. Styrene Sheeting and Rigid Digital Print Media
1. Provide bright white styrene sheeting suitable for use as a substrate for high-resolution graphics printed using UV-resistant inks.
2. The thickness of material shall be determined by the Contractor, subject to review by the Designer and the Owner. Coordinate media thickness with the construction of the sign cabinets that shall hold the printed panels. Provide in thickness as recommended by the manufacturer for each location.

F. Vinyl Graphic Films/Sheeting:
1. Opaque Vinyl Graphic Film: 3M Scotchcal ElectroCut Film, Series 7725, opaque, or an approved substitution opaque film accepted by the Designer and the Owner.
2. Translucent Vinyl Graphic Film: Orafol/Oracal 8500 Translucent Graphic or an approved substitution translucent film accepted by the Designer and the Owner.

G. Paint:
1. Paint shall be Matthews Acrylic Polyurethane with a non-glare finish, or an approved substitution acrylic polyurethane paint formulated for use on signage. The non-glare finish of the paint shall conform to all applicable ADA guidelines and requirements.
2. Painted surfaces shall receive a compatible UV inhibiting, vandal-resistant, and graffiti-resistant protective clearcoat with a non-glare finish. The non-glare finish of the protective clearcoat shall conform to all applicable ADA guidelines and requirements. The topcoat and the clearcoat shall be supplied by the same manufacturer.

H. Colors:
1. All colors and finishes shall be UV-resistant and vandal-resistant.
2. Exterior surfaces of wayfinding signs, wayfinding sign components, letters, symbols, logos, structural and mounting components, and other wayfinding sign elements shall be finished to match the colors specified.
3. Color numbers refer to the Drawings. Match the colors listed. Indicate the finish materials and reproduction methods to be used on design Submittals and the Shop Drawings. Submit appropriate Samples for review and acceptance in each of the colors; in each of the finishes, films/sheetings, coatings, or materials; and on each of the substrates to be used.

I. Lettering Style:
1. The Contractor shall provide all the required fonts as indicated in the Drawings the Owner shall not provide any fonts.
2. Letter weight (Medium, Black, etc.) and style (Roman, Italic) shall match the Drawings. Legends shall include letters, numbers, arrows, symbols, logos, graphics, borders, characters, typography, and other applications shown for wayfinding sign panels. Enlargement or reduction of artwork applications shall be done photographically or digitally. Hand cut masks or templates will not be accepted.
3. Wayfinding sign lettering shall be executed in such a manner that all the edges and corners of the letterforms and symbols are true, clean, and photographically precise. All letterforms and symbols must be accurately reproduced.

J. Symbols:
1. Symbols shall match the Drawings prepared by the designer.
2. Symbols shown in the Drawings are for reference only and are not for reproduction. Symbol artwork must be precisely formed and must accurately reproduce the symbol graphics. Poor quality, poorly reproduced, or otherwise inaccurate symbols shall not be accepted.
3. Submit samples of all symbols for review and acceptance by the Designer and the Owner prior to fabrication.
4. Symbols, logos, and logotypes shall be executed in such a manner that all edges and corners are true, clean, and photographically precise. All symbols, logos, and logotypes must be accurately reproduced.

K. Adhesives:
1. Provide high quality, high strength, high performance, durable, exterior grade, permanent adhesives as required. Adhesives shall be suitable for the components being adhered and the locations where the components are to be mounted or installed.
2. Adhesives shall not react with surface finishes.

L. Silkscreen and Silkscreen Ink:
1. Photographic screen. Hand cut screens will not be accepted. Screens shall be fine mesh fabric as required.
2. Silkscreen inks shall be UV-resistant and compatible with the specified substrates and finishes. Do not blend materials from different manufacturers.
3. Acceptable silkscreen ink manufacturers include:
   a. Naz Dar
   b. Akzo Coatings
   c. Spraylat (PPG) Corp.
   d. 3M – for use with 3M graphic sheeting

M. Sign Lighting Components:
1. Provide all required sign lighting fixtures and all related components.
2. Internal sign illumination shall be provided by concealed, white LED. Lamp life 60,000 hours minimum. Acceptable lamp manufacturers that may submit products meeting the specification requirements for review include: US LED, GE Lighting, Hanley LED, Phillips Lighting, Sylvania, Everylite, or other manufacturers accepted by the Owner.
3. Determine the length, quantity, layout, wattage, and spacing of the LED and NEON/LED lamps required to provide bright, even illumination of the wayfinding sign faces.
4. Provide all the required components, hardware, conduit, connections and wiring as necessary.

N. LCD /LED Display Monitors, Custom Mount:
1. Install monitors and mounting brackets as required for each sign type that mounts the LCD/LED video display (i.e. X sign types).
2. See structural drawings related to signage connection/anchor reinforcementdetails. See Divisions 26, 27 and 28 for electrical / data / communications wiring and coordination with electrical / data / security elements.

O. Fabricated Channel Back-lit Illuminated Letters:
1. Design Basis Manufacturer: Gemini Signs, Inc.
2. Product: Fabricated Channel Cut Painted Aluminum with Back-lit LED, and finished back.
3. Attachment: Mechanical Fastening to Interior Wall / Portal.
4. Color: see Drawings.
5. Division 26 re: Power supply by other.

P. Panel Signs, Molded Radius Holders, and Brackets.
1. Attachment: Mechanical Fastening (MF) unless substrate does not allow;
2. Alternate attachment: (VT) Double-faced tape. Alternate attachment at projecting conditions: Projecting Wall Mount.
3. Unframed Panel Signs:
   a. Edge condition: Square cut.
   b. Edge color for plaque: Edge color same as background color
   c. Corner Condition: Radiused.
4. Raised Copy: Provide raised copy/graphics panels suitable for both interior and exterior exposure.
   a. Provide raised copy 0.8mm and domed Grade II Braille dots.
   b. Produce raised copy/graphics using photosensitive plastic fused to a rigid plastic base.
   c. Engraved, Applied, Chemically Welded or surface applied letters and Braille are not allowed.
   d. Raised text/symbol color can be thermo-press or silk-screened and a satin clear polyurethane topcoat added for optimal durability.
5. Wall Mount Bracket: 90-Degree Stand-off Bracket to match sign series; locations as indicated on the Drawings by sign type B (Bracket Mounted).

Q. LCD / LED Display Suspension for Mounting Brackets
1. The new suspension mounting systems shall be as designated in the drawings or approved substitution.

ELECTRICAL FABRICATION

A. Provide all electrical engineering as required for all wayfinding signs and wayfinding sign components that require electric power. Coordinate wayfinding sign electrical and data requirements with the building electrical and data systems as referenced in documents.

B. All electrical and lighting components provided for the wayfinding signs shall be UL listed. Identify on the Shop Drawings the materials and wiring to be used. Internally illuminated signs and signs with video (LCD/LED) displays shall be internally wired with concealed leads for connection to the electric power/data services.

C. All the wayfinding signs that are connected to the electric power service, that are illuminated, or that include powered equipment or video/data displays, shall conform to all applicable electric codes including, but not limited to, the National Electrical Code and all applicable Codes, standards, guidelines, and requirements. All wayfinding signs that are connected to the electric power service, that are illuminated, or that include powered equipment or displays, shall also comply with all applicable UL, ANSI, and NEC safety and performance standards and all other applicable safety and performance standards. Where a UL standard is unavailable, the equipment supplied for the Project shall be UL listed and shall bear the UL label. All wayfinding signs that are connected to the electric power service, that are illuminated, or that include powered equipment or displays, shall be UL approved. The Contractor's and/or manufacturer's name shall not appear on the visible surfaces of the signs except as required by code.

D. The Contractor shall route, furnish, and install all required electrical and data conduit, wiring, cables, fixtures, and components. The Contractor shall furnish and install all sign lighting components required for all new illuminated wayfinding signs. The Contractor shall furnish and install all LCD/LED displays and all related components for all wayfinding signs that include LCD/LED displays (Sign Types 'X').

E. The Contractor shall determine where power and data for the sign locations can be accessed based on the Contract Document requirements. The Contractor shall route the power and data to the sign locations. Run power and data conduit and wiring to the sign locations as required and make all the necessary connections. Provide the Designer and the Owner with Shop Drawings for review showing where power and data for the signs will be accessed, and how the power and data conduit will be routed from the source locations to the sign locations.

F. All wayfinding signs and wayfinding sign components with electrical service shall be equipped with an approved external disconnect switch. The switch shall have circuits and capacity to control all primary wiring within the sign. The switch shall comply with all applicable code requirements. The location of switch shall be shown on the Shop Drawings for review by the Designer and the Owner.

G. All wiring shall be routed through the wayfinding sign frames, the sign pendant mounting components, the sign "structure" mounting components (i.e. exterior), and/or the sign enclosures to the electrical and data components housed within, or mounted to, the wayfinding signs. There shall be no visible conduit, transformers, or raceways.

H. Coordinate the placement and routing of conduit and placement of cutoff switches and other electrical components with the wayfinding sign graphics and the wayfinding sign structures and mounting. Cutoff switches shall be consistently placed within sign type groups. Electrical components must not interfere with the functioning or appearance of the wayfinding signs.

PAINTING AND FINISHES

A. All wayfinding sign finishes, coatings, and graphic reproduction methods shall be durable, high quality, UV-resistant, and vandal-resistant. Provide Product Data and information on all the finishes, coatings, and graphic reproduction methods to be used for review by the Designer, and the Owner.

B. Finish all wayfinding sign components to protect them from corrosion with materials and finishes as appropriate for the component, its location, and its visibility. Indicate all finishes to be used in the Shop Drawings.

C. Thoroughly clean and properly prepare all surfaces to be finished in strict accordance with the finish manufacturer's instructions. Follow the paint manufacturer's instructions to properly clean and prepare surfaces to be painted. Remove all dust, dirt, foreign materials, waxes, grease, silicones, and other contaminants from the surfaces to be finished following the manufacturer's recommendations.

D. Properly protect all surfaces and materials from rust and corrosion at all times.

E. Protective paint systems shall be applied in the shop as much as possible. All primer shall be applied in strict accordance with the manufacturers' published technical bulletins, procedures, and instructions. Steel material shall be shop coated with one (1) coat of primer. Surfaces that will be inaccessible for painting after assembly or installation shall be given two (2) shop coats of primer. All primers shall be appropriate for the substrate and the finish, as recommended by the manufacturer.

F. Provisions should be made for proper handling at all stages of the priming, painting, shipping, storing, erection, and installation for protection of primed and/or painted surfaces from damage or soiling.

G. The paint topcoat shall be applied in strict accordance with the manufacturers' published technical bulletins, procedures, and instructions.
1. 1Paint shall be applied in the shop as much as possible.
2. 2Apply paint topcoat over compatible primer. Apply paint topcoat to achieve the minimum dry film thickness recommended by the manufacturer to provide a high quality, durable finish and optimum corrosion protection.

H. Apply a non-glare protective clearcoat containing UV inhibitors to external painted and silkscreen printed wayfinding sign surfaces. The non-glare protective clearcoat shall conform to all applicable ADA guidelines and requirements. Polished aluminum /satin finished aluminum shall also receive a protective gloss clearcoat. The clearcoat and the color topcoat shall be manufactured by the same company. Formulate the clearcoat to be compatible with the finishes and materials to which it will be applied and to provide maximum protection and longevity. Apply the clearcoat to achieve the minimum dry film thickness recommended by the manufacturer to provide a high quality, durable finish and to insure protection of the finish, color, and substrate underneath.

I. Paint surfaces and materials as required to provide proper performance, protection, function, appearance, durability, and longevity. Do not paint surfaces and materials where the paint would in any way interfere with proper assembly, installation, mounting, performance, function, appearance, durability, and longevity. Inform the Designer and the Owner of any conditions where the wayfinding sign finishes would interfere with the function or longevity of the wayfinding signs.

J. After being brushed, ground and polished, or where subject to severe forming operations, stainless steel surfaces shall be cleaned of all extraneous material, thoroughly rinsed with clean water and dried. Lubricants used in fabrication shall be removed before work leaves the shop.

K. Field touch up primer after assembly and installation (all interior surfaces including bolted connections nuts, and washers, etc.) one coat.

L. Protection of metals against galvanic action shall be provided wherever dissimilar metals are in contact. All metals except galvanized steel and stainless steel, which will be in contact with concrete, mortar, plaster, or other masonry, shall also be protected. Indicate the type of protection to be provided in the Shop Drawings.

FABRICATION

A. All wayfinding signs shall be structurally sound and carefully fabricated using high quality materials and quality craftsmanship. All wayfinding signs and sign components shall be carefully, properly, securely, and safely assembled and attached. All wayfinding signs and sign components shall be carefully, securely, properly, and safely mounted and installed.

B. Provide all the required labor, site inspection, testing, professional engineering, parts, hardware, materials, and components required to completely, properly, safely, and securely fabricate and install all the wayfinding signs, all the wayfinding sign structures, and all the wayfinding sign components. Provide all the internal and external framing and components required to safely, securely, and properly support the signs, the sign faces, and any other components that are mounted to or in the wayfinding signs.

C. All wayfinding signs shall be fabricated to have a neat and clean appearance. All wayfinding signs shall be rigid and structurally sound. Wayfinding sign materials, design, sizes, and thickness shall be as shown on the Shop Drawings and herein specified. Methods of fabrication, assembly, erection, mounting, and installation, however, unless otherwise specifically stated, shall be at the discretion of the Contractor, whose responsibility it shall be to guarantee satisfactory performance as herein specified.

D. All wayfinding sign components including, but not limited to, wayfinding sign frames, wayfinding sign structures, wayfinding sign cabinets, wayfinding sign hardware, wayfinding sign pendant mounting components, and all other wayfinding sign mounting systems and components shall be professionally engineered prior to fabrication.

E. Size the wayfinding sign frames and wayfinding sign face panels to allow for expansion and contraction of the wayfinding signs and wayfinding sign components without causing the signs to become damaged or the sign faces to become warped, cracked, or otherwise damaged.

F. Provide mounting hardware and mounting components that are compatible with the conditions at each of the installation locations. The Contractor shall provide sign and sealed Shop Drawings for mounting hardware and other structural components for the sign.
1. Prior to fabrication, verify the as-built conditions at each mounting location on site.
2. Determine the type of mounting hardware and components required for each condition and each location.
3. Indicate the mounting hardware and components in the Shop Drawings.
4. All mounting hardware and mounting components shall be properly sized,compatible with the wayfinding signs and the structures supporting the wayfinding signs, and shall provide the proper strength and durability.
5. Use materials and hardware that will provide long service life and will properly, securely, and safely support the wayfinding signs. All mounting components and mounting hardware shall be durable, high quality, long lasting, vandal-resistant, tamper-resistant, and corrosion-resistant components.
6. Provide all the necessary straps, clips, brackets, and all other hardware and components required to safely, securely, and properly mount the wayfinding signs. There shall be no sharp projections or edges on either the wayfinding signs or the mounting hardware and components.

G. All artwork shall be enlarged digitally to match the contract documents as shown in the Drawings and Message Schedule. Provide all file preparation required. Assemble legends, prepare digital files, and prepare art.

H. Provide access to allow servicing of components housed within the wayfinding signs, wayfinding sign cabinets, or wayfinding sign structures and/or to allow structural connections, electrical and data connections, or access to mounting hardware. The finishes of the removable wayfinding sign surfaces shall match the surrounding areas, unless otherwise noted. Service covers, doors, access panels, and other openings in the wayfinding signs, wayfinding sign cabinets, or wayfinding sign structures shall be weather-tight and gasketed to prevent water, dust, or dirt from entering the wayfinding signs, wayfinding sign cabinets, or wayfinding sign structures. Unless otherwise noted, provide hold open devices for service covers, doors, access panels, and other openings in the wayfinding signs that are adequate for safety and ease of maintenance. Hold open devices shall not be released accidentally, or by the action of the wind, and shall not interfere with the display when the service covers, doors, access panels, and other openings in the wayfinding signs are closed. Service covers, doors, access panels, and other openings in the wayfinding signs, wayfinding sign cabinets, or wayfinding sign structures shall be held securely closed with concealed tamper-resistant and vandal-resistant hardware or locks. Indicate the exact hardware to be used in the Shop Drawings.

I. Wayfinding sign faces and edges shall be flat, rigid, smooth, and free of defects and "oil-canning." Edges and corners shall be precise, smooth, true, and free of saw marks, chips, burrs, discoloration, irregularities, and any other defects. Corners shall be eased. Faces and returns shall be flat, precise, smooth, true, and free of saw marks, chips, burrs, discoloration, irregularities, and any other defects. There shall be no sharp or rough edges, no sharp or rough corners, and no sharp or rough projections anywhere on the wayfinding signs. Seams shall have hairline contact. Wayfinding sign faces shall be of sufficient thickness that hardware or materials mounted to or attached to the backs of the sign faces shall not distort or discolor the fronts of the sign faces or otherwise detract from the smoothness and the appearance of the sign faces in any way. Joints shall be undetectable and completely and permanently sealed. There shall be no visible hardware on any sign faces unless indicated in the Drawings. Any visible hardware shall be finished to match the surrounding material.

J. Provide ventilation of wayfinding sign housings, structures, and cabinets as required to prevent the wayfinding signs from becoming damaged from heat, to prevent internal components from overheating, to prevent any electronic components or displays mounted within the signs from overheating, and to prevent wayfinding sign faces from warping or otherwise becoming damaged from heat, while maintaining a proper weather seal. Wayfinding signs and sign cabinets with light leaks will not be accepted.

K. Place weep holes and openings for ventilation and to allow water accumulated through condensation to drain. Place weep holes and vents so as to not interfere with the display of the graphics and to be as unobtrusive as possible. Indicate the location of weep holes and vents in the Shop Drawings. Provide screening over all weep holes and vents to prevent animals and insects from entering the wayfinding sign structures and wayfinding sign cabinets. Fabricate the weep holes and vents so that the interiors of the wayfinding sign structures and wayfinding sign cabinets are not visible through the holes and vents and so that no light is visible through the holes and vents.

L. Internally illuminated graphics shall be completely, evenly, and adequately lit without thin spots, shadows, halos, or hot spots. Opaque sign faces and components must be completely and evenly opaque without thin spots, shadows, halos, or light leaks.

M. Vinyl Graphic Films and Sheeting for Letter Sign Types:
1. Opaque and translucent vinyl graphic films and sheeting shall be handled and applied in accordance with the material manufacturer's instructions.
2. Graphics produced using opaque and translucent vinyl graphic films and sheeting shall be produced in accordance with the material manufacturer's instructions.
3. Cut-out letterforms, symbols, and logos shall be cut out so that their proportions and details are accurately and precisely reproduced. Vinyl graphic films and sheeting applied to wayfinding sign faces and panels shall be neatly trimmed and properly placed and aligned. The edges of the vinyl graphic films and sheeting shall be smooth and free of any tears, irregularities, and defects.
4. Properly clean and prepare substrates to receive opaque, reflective, and translucent vinyl graphic films and sheeting.
5. All opaque and translucent vinyl graphic films and sheeting shall be carefully installed so that the films and sheeting are properly and completely adhered. There shall be no loose edges or gaps between the applied materials and the substrates to which there are adhered. All vinyl graphic films and sheeting shall be installed so that they are completely smooth, flat, even, and without any surface irregularities, wrinkles, air bubbles, and free from any trapped dirt or dust.

N. Hanger Tubes
1. Provide for all signs, new hanger tubes for pendant mounted overhead wayfinding signs. Provide all hardware, patching and repair required to safely, securely, and properly mount the new tubes in their correct positions. The new hanger tubes shall conceal the pendant mounting components and any electrical and data conduit. The new hanger tubes with the escutcheon component shall also conceal holes drilled into the ceiling for the mounting components. If the existing holes drilled into the ceiling are larger than the new hanger tubes, provide repairs as required to conceal the holes. Verify the correct length for each new hanger tube on site. Installed hanger tubes shall be plumb and straight. Coordinate all new hanger tubes with the sign mounting components and the top cap fabrication.

O. Internally Illuminated Wayfinding Sign Cabinets:
1. New internally illuminated wayfinding sign cabinets shall be fabricated from aluminum. Thickness of the aluminum shall be adequate for the size of sign cabinet. Finishes shall be as shown in the Drawings.
2. The internal illumination shall be provided by concealed white LED lamps.The Contractor shall determine the lamp circuitry, quantity, wattage, and spacing required to provide even and adequate illumination of the entire sign face. The color of the new LED lamps shall be the color of the lamps as specified (6500K natural white). Provide all the required hardware, fittings, fixtures, raceways, and all other components and materials required to properly, safely, and securely install the LED lamps and all the related components.
3. The inside surfaces of the sign cabinets shall be finished with a reflective white coating, specifically formulated for use in internally illuminated sign cabinets, such as Spraylat (PPG) Star-Brite White, or an approved substitution reflective coating.
4. The wayfinding sign cabinets shall be fabricated so that their corners shall be smooth, free from defects, burrs, and discoloration. Faces, edges, and returns shall be flat, smooth, and free from irregularities and defects. Joints shall be undetectable and completely and permanently sealed. The wayfinding sign cabinets shall provide bright, even lighting across the entire sign face.
5. Provide durable, corrosion-resistant internal framing for the wayfinding sign cabinets as required for the cabinets to be rigid and structurally sound and to safely, securely, and properly support the sign faces and any other components mounted to the wayfinding sign cabinets. Provide all internal framing as required for the cabinets to be safely, securely, and properly mounted.
6. Internally illuminated wayfinding sign cabinets shall be safely, securely and permanently mounted. Provide all the appropriate mounting components, hardware, materials, and methods required. There shall be no visible hardware, raceways, or conduit.
7. Provide hanger tubes for pendant mounted overhead wayfinding signs. The hanger tubes shall conceal the pendant mounting components and any electrical and data conduit. The hanger tubes shall also conceal holes drilled into the ceiling for the mounting components. Verify the correct length for each hanger tube on site. Installed hanger tubes shall be plumb and straight. Provide all hardware required to safely, securely, and properly mount the tubes in their correct positions. Coordinate the hanger tubes with the sign mounting components and the top cap fabrication.

P. Provide wayfinding signs and wayfinding sign assemblies that are designed,tested, and installed to withstand positive and negative wind loads appropriate for the install locations, and approved by a qualified professional licensed structural engineer. Furnish engineering calculations to show that maximum stresses and deflections of the wayfinding signage and the wayfinding signage support systems do not exceed specified and required performance requirements under full design loading. Calculations shall be prepared, signed, and sealed by a qualified professional structural engineer, licensed in the State of Florida and submitted with the Shop Drawings.

Q. Insofar as practicable, fitting and assembly of the Work shall be done in the shop. Work that cannot be permanently shop-assembled shall be completely assembled, marked, and disassembled before shipment, to insure proper assembly in the field. Unless otherwise noted, field joints in the face of wayfinding signs shall not be allowed. The Contractor shall coordinate sizes of finished assemblies with access limitations to final locations.

R. Steel and aluminum shall be well formed to shape and size. Fabrication shall leave clean, true lines and surfaces. Carefully match exposed work to produce continuity of line and design. Joints and seams, unless otherwise shown or specified, shall be accurately fitted and rigidly secured with hairline contact.

S. Welding shall be in accordance with appropriate recommendations of the American Welding Society, and shall be done with electrodes and methods recommended by the manufacturers of the alloys being welded. Type, size, and spacing of welds shall be as shown in the Shop Drawings. Welds behind finished surfaces shall be so done as to minimize distortion and discoloration on the finished side. Weld spatter and welding oxides on finished surfaces shall be removed by descaling or grinding. Unless otherwise shown or specified, all weld beads on exposed polished surfaces shall be ground and polished to match and blend with the finish on the adjacent parent metal. Remove paint from existing steel members at contact areas and on surfaces within two inches (2") of field welds, in order to attach signage steel supports. At attachments to exposed steel, grind exposed field welded joints smooth and restore to match factory finishes.

T. Welding shall be executed by experienced, certified operators with proper equipment and training and who have been qualified previously by tests as prescribed in the American Welding Society's "Standard Qualification Procedure" to perform the Work required.

SOURCE AND MANUFACTURES

A. Source Quality Control:
1. Obtain primary materials from a single manufacturer.
2. Provide secondary materials only as recommended by the manufacturer of the primary materials.
3. Do not change source or brands of materials during fabrication

B. Signs shall be designed and manufactured by the following or entity that is approved by Architect and Owner following substitution request procedures. Approvals must be in writing:

Himes Signs Corporation
PO BOX 5324 - #4 Commerce Park
Destin, FL 32540
850-837-1159
Johnny Himes

Architectural Graphics, Inc.
2655 International Parkway
Virginia Beach, VA 23452
800-877-7868
757-427-1900 x 270
Mr. Richard Sumttion

Media One Graphix
150 National Place #100
Longwood, FL 32750
877-972-7844
Mr. Rick Ream

APCO Signs
10012 N. Dale mabry Hwy.
Suite 217
Tampa, FL 33618
813.960.1672
Ms. Gina Leto

A.C. Signs
10201 Rocket Ct.
Orlando, FL 32824
407.857.5564
Mr. Rob Jarvis

Universal Sign Systems
5001 Falcon View SE
Grand Rapids, MI 49512
616.554.9999
Mr. Nate Zevenbergen

Other manufacturers may be considered if they meet Quality Assurance Criteria and are subject to Product substitution review per Section 26 0508 by the Architect/Engineer. Substitutions must be requested in writing, along with documentation per Section 01 2513 Product Substitutions.

OKALOOSA COUNTY

FLY VPS

C19-2811- AP Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
SUITE 107
MAITLAND, FL 32751
407.897.6764 (VOICE)
407.894.1338 (FAX)
WWW.MLM-MARTIN.COM
AA-C002208
MLM JOB #: TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MAM
Drawn By:	MAM
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	NO SCALE

Drawing Title:

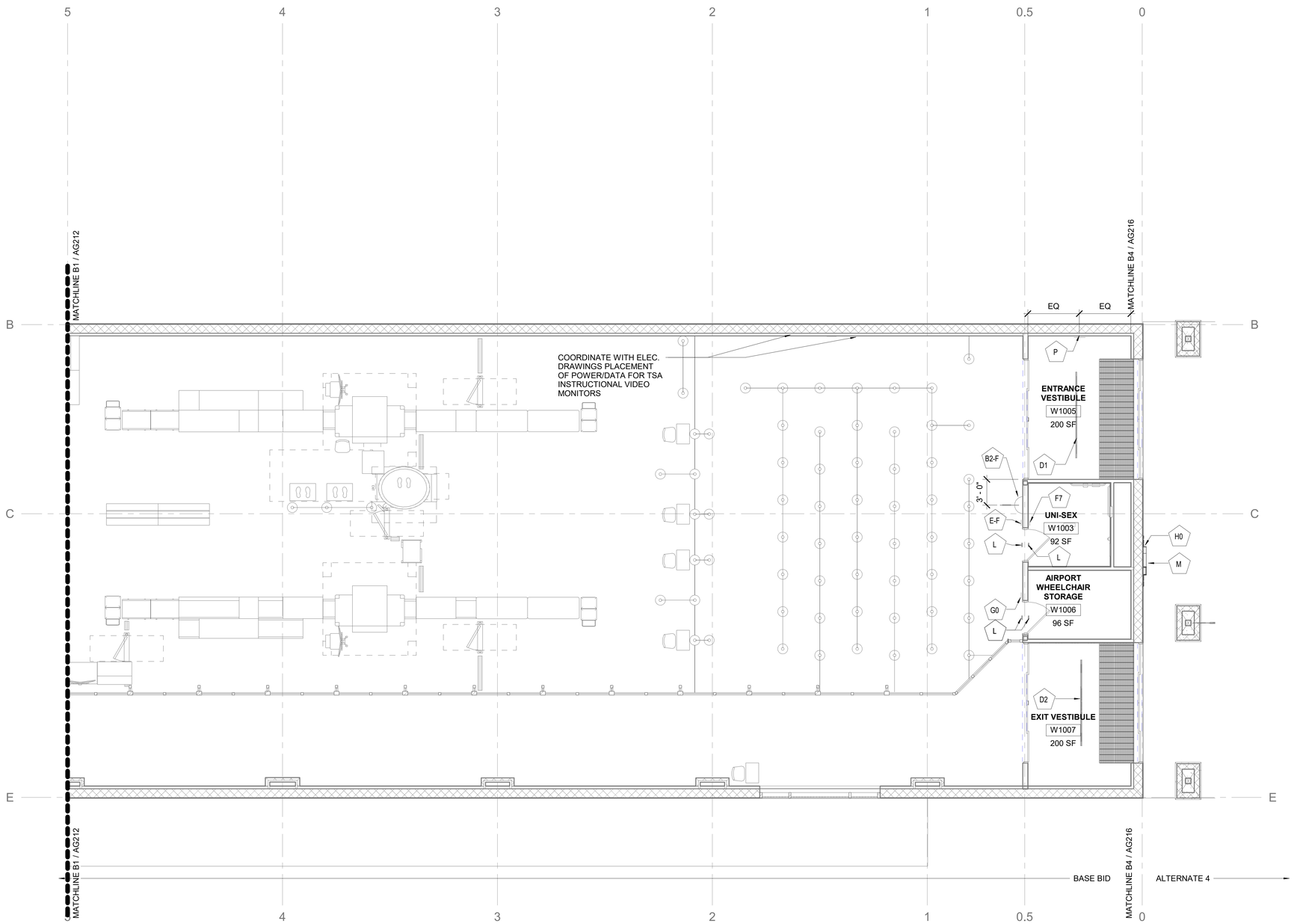
SIGNAGE GENERAL NOTES

BID DOCUMENTS

Drawing No.:

AG112

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt
12/8/2020 5:52:00 PM



B1 CONCORSE WAYFINDING PLAN

3/16" = 1'-0"

NOTES

1. REFER TO **AL641** FOR PARTITION TYPES
2. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET SERIES **A711**
3. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
4. REFER TO **A** SERIES SHEETS FOR DIMENSIONS.
5. AREA DESIGNATED FOR FUTURE WORK (NIC). CONTRACTOR SHALL KEEP THIS AREA CLEAR OF ANY BUILT ELEMENTS ABOVE AND/OR BELOW GROUND UNLESS OTHERWISE NOTED WITHIN THE SCOPE OF THIS PROJECT.
6. ALL GRADE II BRAILLE IS PRESENTED FOR GRAPHIC REPRESENTATION. CONTRACTOR TO COORDINATE WITH FABRICATOR THAT ACTUAL BRAILLE PRODUCED TRANSLATES THE COPY PROVIDED.
7. MESSAGES ILLUSTRATED IN DRAWINGS ARE NOT ACTUAL MESSAGES BUT FOR LAYOUT PURPOSES ONLY. SEE MESSAGE SCHEDULE FOR SPECIFIC MESSAGES. NOTE THAT BID ISSUE OF THE MESSAGE SCHEDULE IS "DRAFT" LEVEL AND IS TO BE UPDATED BY FABRICATOR THROUGHOUT PROJECT CONSTRUCTION SUBMITTAL PROCESS.
8. SIGN LOCATION PLAN SYMBOLS INDICATE GENERAL SIGN LOCATIONS. THEY ARE NOT REPRESENTATIVE OF ACTUAL SIGN SIZES OR OR LOCATIONS. SEE MOUNTING DETAILS FOR MOUNTING LOCATION INFORMATION. CONDUCT PRE-CONSTRUCTION MEETING IN FIELD WITH AIRPORT, AND ARCHITECT TO ESTABLISH PROTOTYPICAL LOCATIONS AND HEIGHTS FOR EACH SIGN TYPE.
9. FABRICATOR TO FIELD VERIFY ALL EXISTING CONDITIONS AND THEIR IMPACT ON FINAL SIGN DIMENSIONS PRIOR TO FABRICATION.
10. SUBSTITUTE TYPEFACES, ARROWS OR SYMBOLS WILL NOT BE ACCEPTED. ALL SYMBOLS TO BE STANDARD F.A.A., AIGA, DOT, ANSI, ADA SYMBOLS. IF NECESSARY, CONTACT ARCHITECT FOR INFORMATION ON AVAILABILITY.
11. ALL FASTENERS TO BE CONCEALED AND VANDAL RESISTANT UNLESS OTHERWISE NOTED.
12. FABRICATOR TO BE RESPONSIBLE FOR PULLING ALL PERMITS AND COORDINATING ALL INSPECTIONS REQUIRED IN CONNECTION WITH THE WORK.
13. SIGN LOCATION SYMBOLS IN PLAN ASSIGNED SHOULD BE CROSS REFRENCED TO ELEVATION FOR INDICATION THAT SIGN IS DOUBLE FACED. PROJECTIONS SIGNS ARE ALSO DOUBLE FACED.
14. FABRICATOR SHALL BE RESPONSIBLE FOR PREPARATION OF ITS SUBMITTALS AND PULLING OF ALL NECESSARY PERMITS AND VARIANCES, (IF APPLICABLE), INCLUDING SUBMITTALS FOR OTHER RELATED REVIEW COMMITTEES FOR THIS PROJECT'S JURISDICTION. TASKS ALSO INCLUDE COORDINATION OF ALL INSPECTIONS REQUIRED IN CONNECTION WITH THE WORK.
15. FABRICATOR SHALL BE RESPONSIBLE FOR LAYOUT AND PRODUCTION OF FULL SIZE TEMPLATES FOR ALL DIMENSIONAL LETTERS AND OTHER SPECIALIZED FORMATS. THESE ALSO REQUIRE THE FIELD REVIEW BY OWNER, ARCHITECT AND OTHER DESIGN PROFESSIONALS.
16. FOR SIGNS IN WHICH THE MOUNTING LOCATION IS REQUIRED TO BE ON GLASS, FABRICATOR SHALL PROVIDE VINYL SHEET PRECISION MEASURED TO SIZE OF SIGN AND APPLIED TO REVERSE SIDE OF GLASS. THE VINYL COLOR SHALL MATCH THE COLOR OF THE SIGN. THE SIGN AND ITS DOUBLE FACED TAPE ARE TO BE APPLIED TO THE VIEWING SIDE OF GLASS. THE "BACKER" VINYL SHALL BE OPTICALLY POSITIONED, SO NO "BACKER" VINYL IS SEEN.
17. DETAILS SHOWN ARE DESIGN INTENT ONLY. CONTRACTOR TO PROVIDE SHOP DRAWINGS AND STRUCTURAL CALULATIONS TO BE REVIEWED BY DEIGNER AND AHJ.

COLOR LEGEND

- ALUMINUM ANNODIZED
- MATTHEWS "RED" - [7A-2A] PMS-179C
- BRISTOL "BLUE" - [75A-4A] PMS-5483C
- CASTLE KEEP "GREEN" - [62C-4D] PMS-7475C
- WHITE
- WHITE TEXT U.O.N.

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction of Satellite Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
SUITE 107
MAITLAND, FL 32751
407.897.6764 (VOICE)
407.894.1338 (FAX)
WWW.MLM-MARTIN.COM
AA-C002208
ALL SUBJECT TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED SIGNAGE PLAN - AREA 1

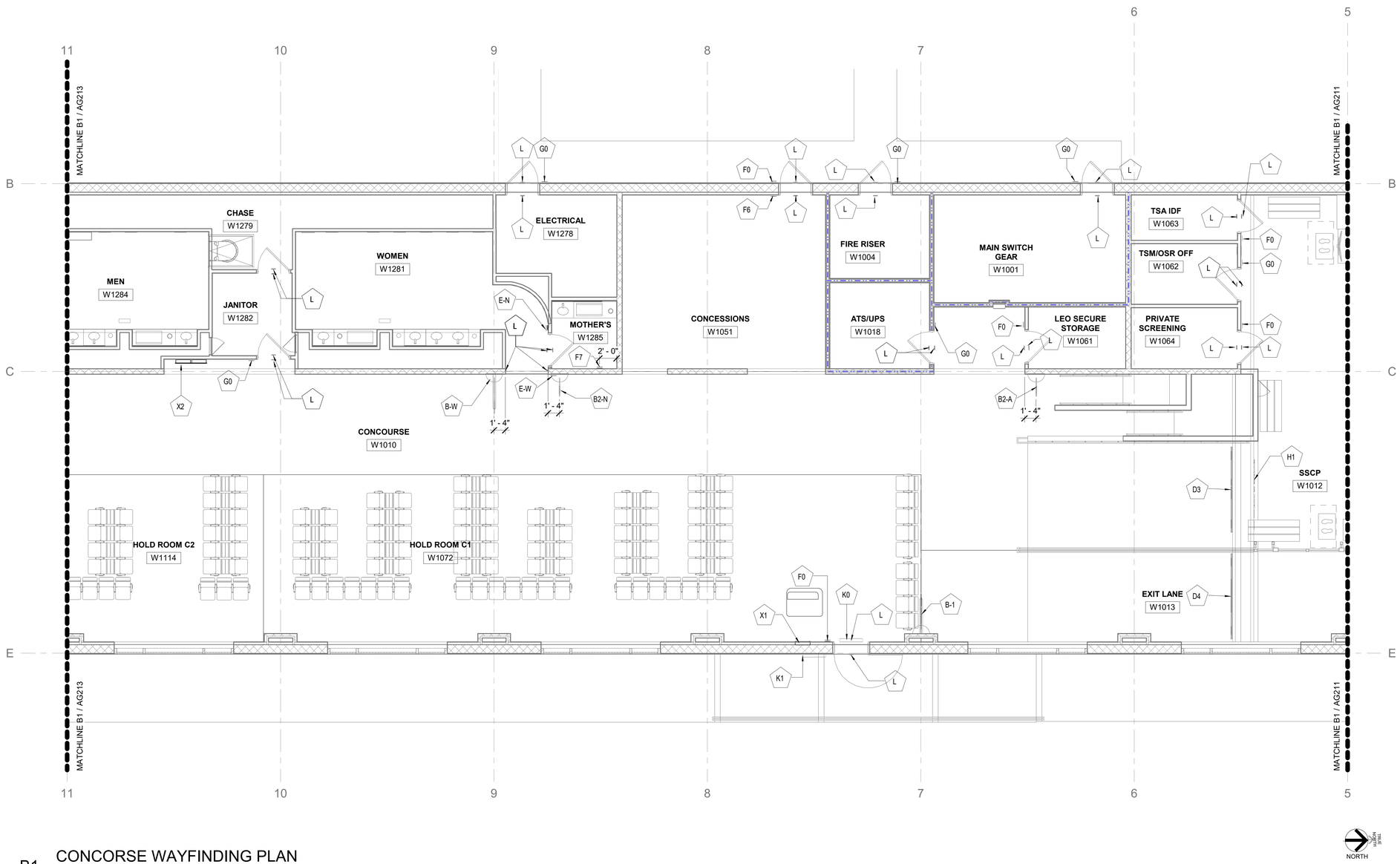
BID DOCUMENTS

Drawing No.:

AG211

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

12/8/2020 5:52:08 PM



B1 CONCORSE WAYFINDING PLAN

3/16" = 1'-0"

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COLOR LEGEND

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- BRISTOL "BLUE" - [75A-4A] PMS-5483C
- CASTLE KEEP "GREEN" - [62C-4D] PMS-7475C
- WHITE
- WHITE TEXT U.O.N.

SCALE: 3/16" = 1'-0"

0 16" 32" 64" 128"

OKALOOSA COUNTY

FLY VPS

C19-2811- AP
Construction of Satellite Concourse 'C'

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WWW.MLM-MARTIN.COM
AA-C002208
ALL JOB & TYPE PROPERTY

MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED SIGNAGE PLAN - AREA 2

BID DOCUMENTS

Drawing No.:

AG212

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

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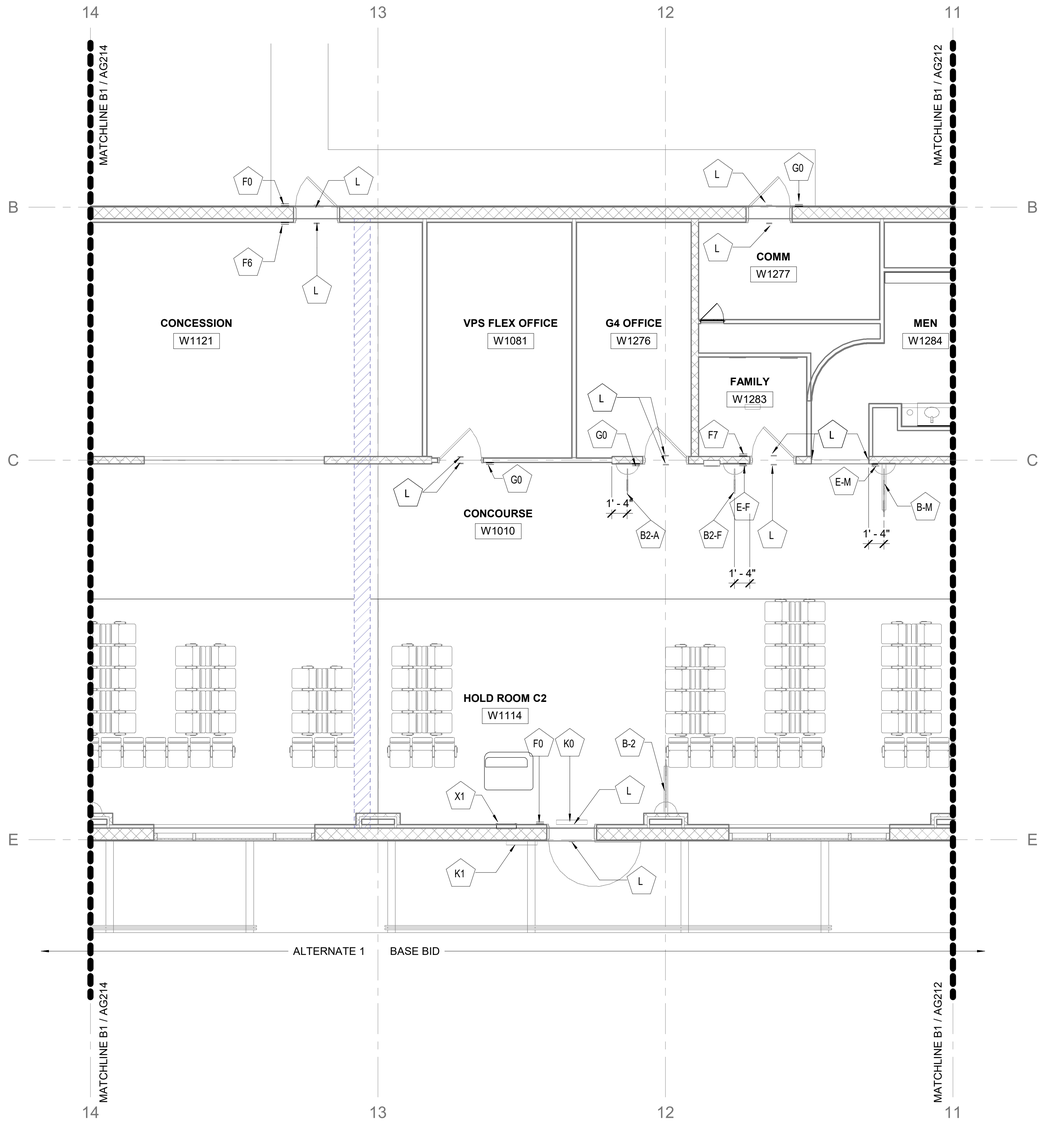

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Issue Date:	30-NOV-2020
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Drawing Title:

ENLARGED SIGNAGE PLAN - AREA 3

BID DOCUMENTS

Drawing No.:

AG213

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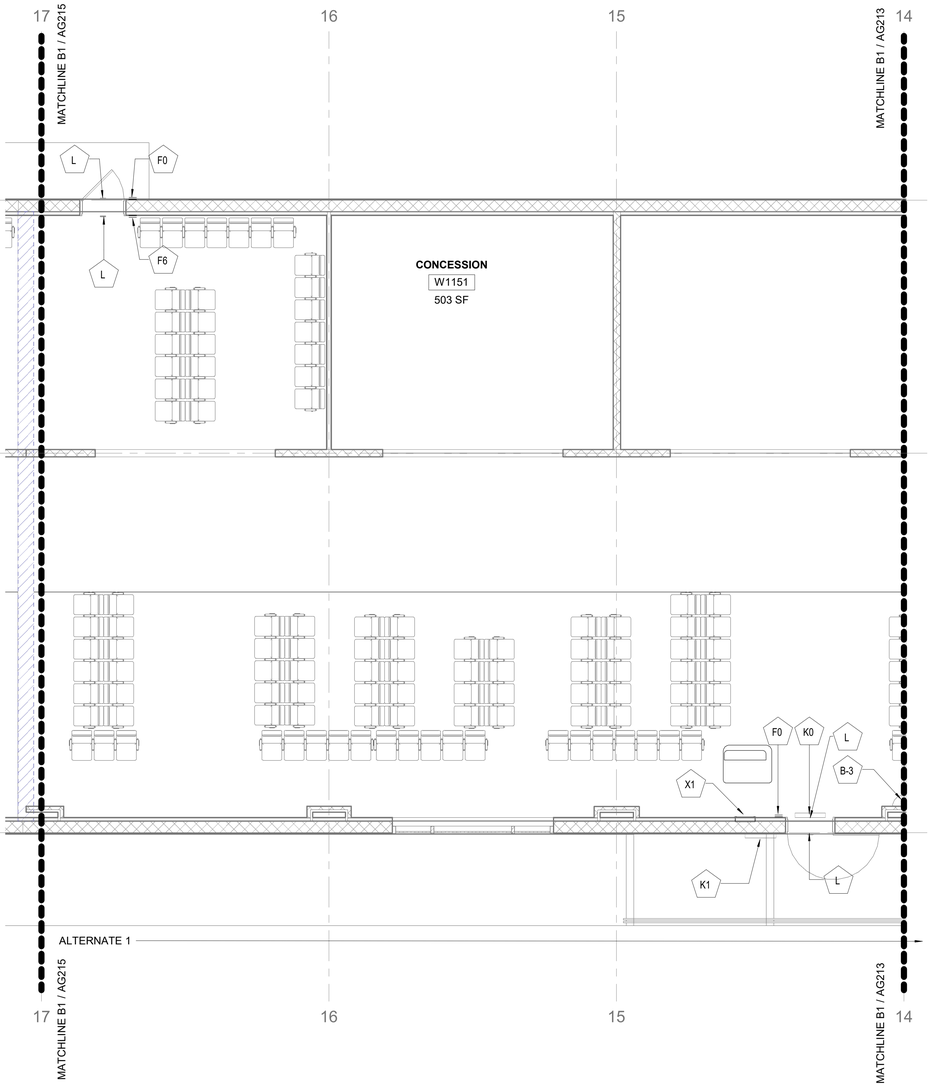

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Revisions

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Project No.:	MLM-19672
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Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED SIGNAGE PLAN - AREA 4

BID DOCUMENTS

Drawing No.:

AG214

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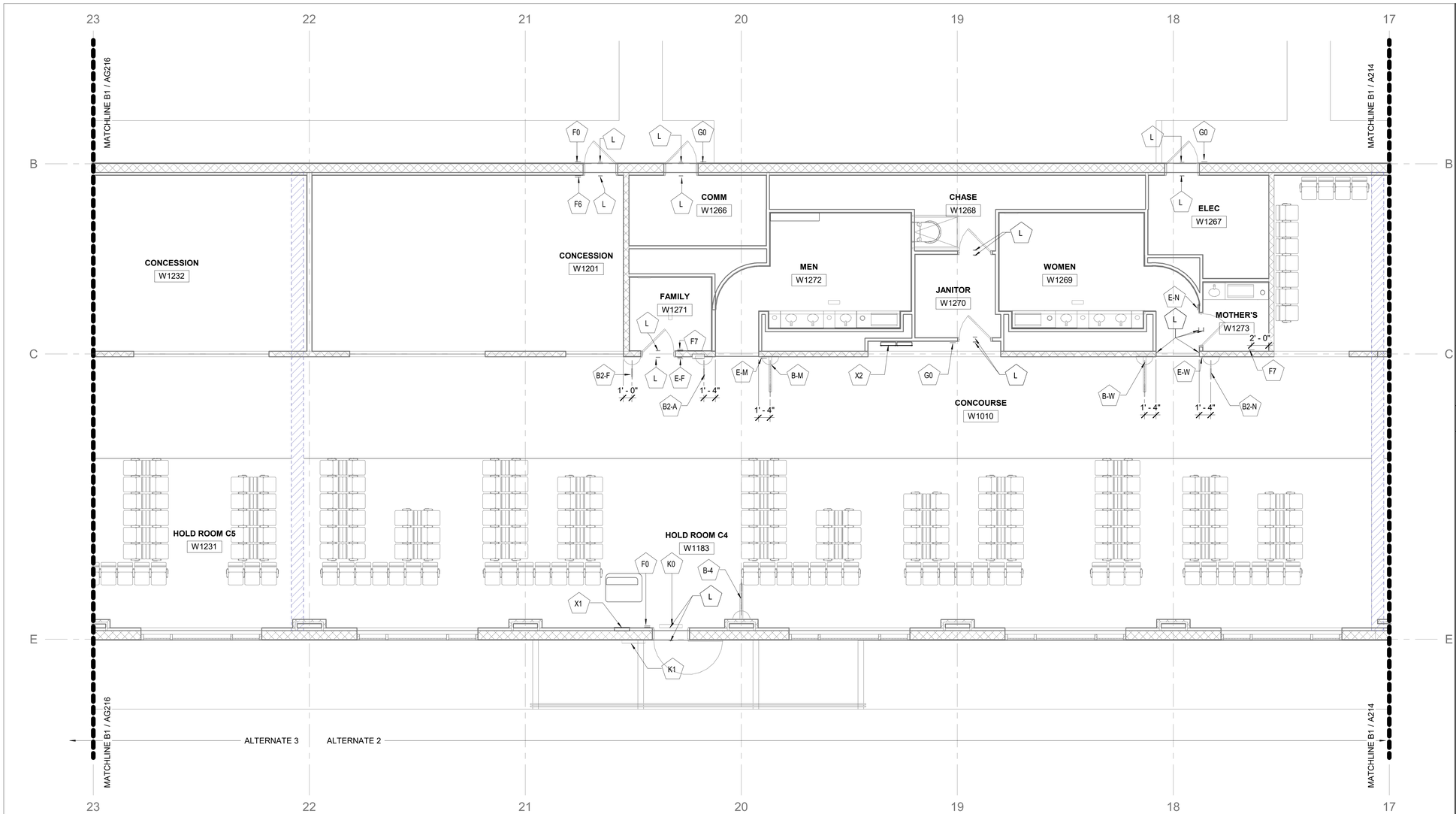

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Drawing Scale:	3/16" = 1'-0"

Drawing Title:

ENLARGED SIGNAGE PLAN - AREA 5

BID DOCUMENTS

Drawing No.:

AG215

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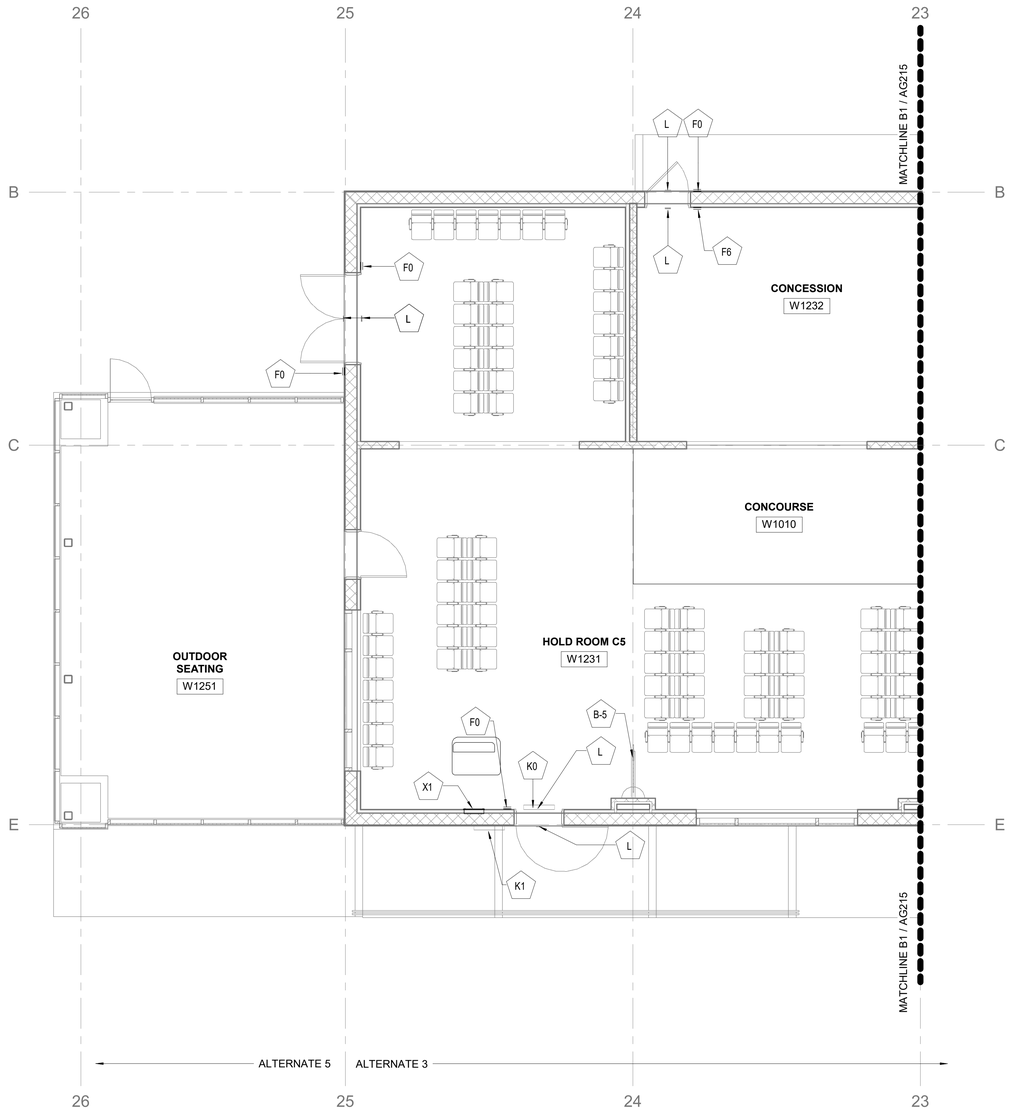

B1 CONCORSE WAYFINDING PLAN

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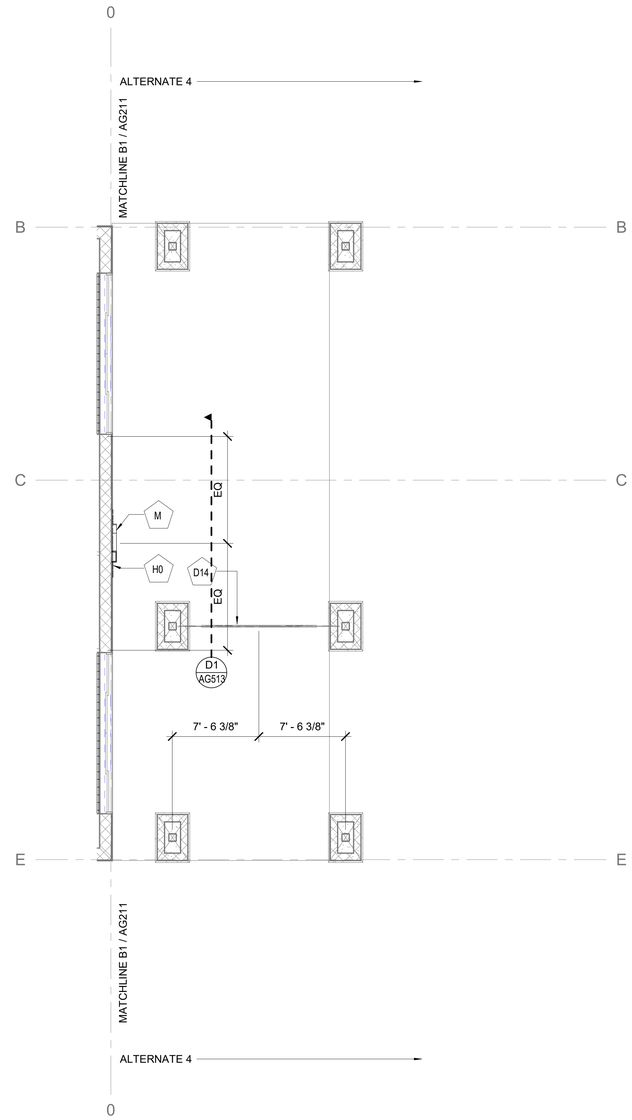

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Revisions

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Project No.:	MLM-19672
Designed By:	MLM, MAM
Drawn By:	ST, CC, DM, CB
Checked By:	MAM
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

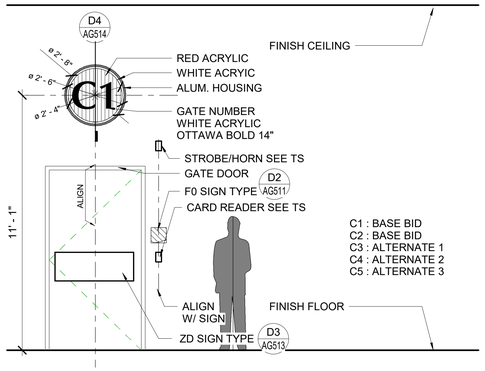
ENLARGED SIGNAGE PLAN - AREA 6

BID DOCUMENTS

Drawing No.:

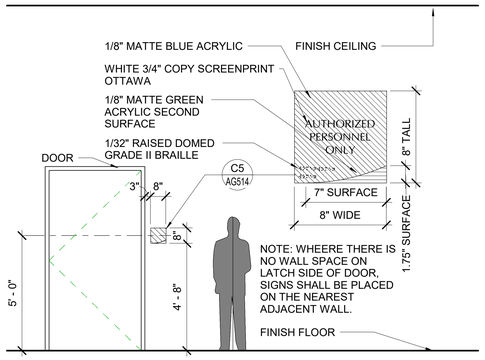
AG216

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt
12/8/2020 5:53:01 PM



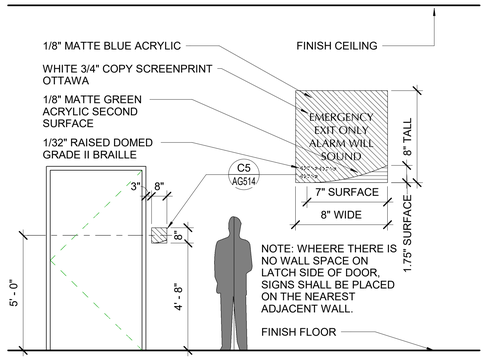
D1 [KO] GATE IDENTITY

3/8" = 1'-0"



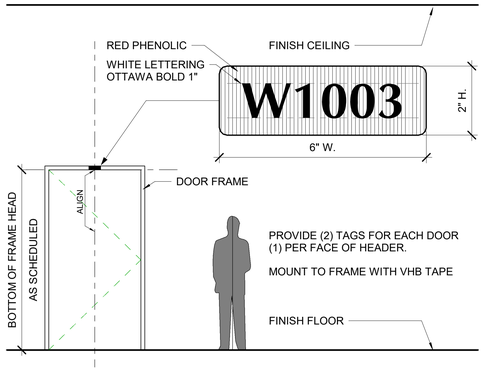
D2 [F0] AUTHORIZED PERSONNEL

3/8" = 1'-0"



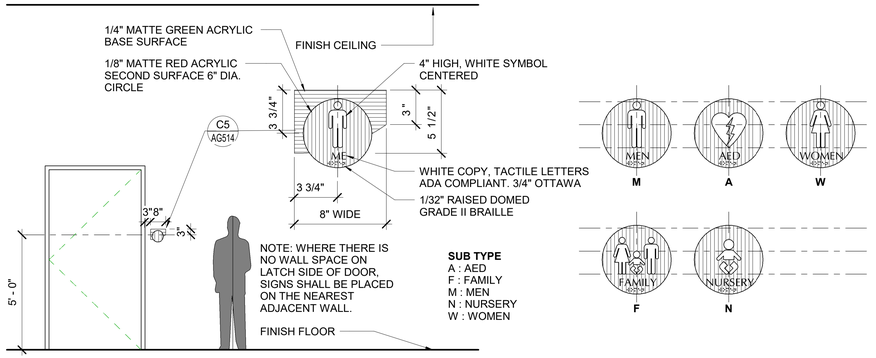
D4 [F6] EXIT ONLY

3/8" = 1'-0"



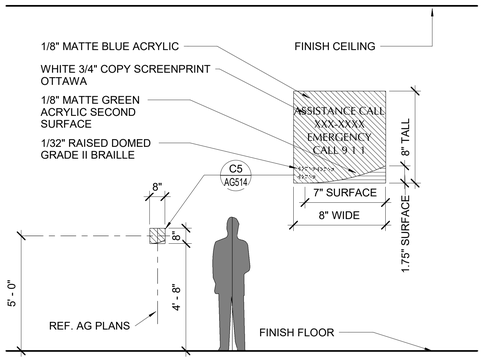
B1 [L] DOOR TAG

3/8" = 1'-0"



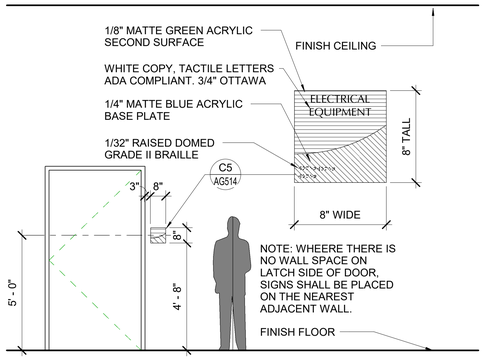
B4 [E-X] FACILITIES SIGN

3/8" = 1'-0"



A1 [F7] ASSISTANCE

3/8" = 1'-0"



A2 [G0] ROOM IDENTIFICATION

3/8" = 1'-0"

G0 - MESSAGE SCHEDULE

DOOR	MESSAGE
W1001	ELECTRICAL EQUIPMENT
W1004	FIRE RISER ROOM
W1006	STORAGE
W1018	ELECTRICAL EQUIPMENT
W1062	TSA MANAGER*
W1081	AIRLINE OPERATIONS*
W1266	COMMUNICATIONS
W1267	ELECTRICAL EQUIPMENT
W1270	JANITORIAL
W1276	AIRPORT OFFICE*
W1277	COMMUNICATIONS
W1278	ELECTRICAL EQUIPMENT
W1282	JANITORIAL

* VPS TO CONFIRM MESSAGE PRIOR TO PRODUCTION

NOTES

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- WHITE TEXT U.O.N.

ELEVATION INDEX

K0	F0	F6
L	E-X	
F7	G0	

SCALE: 3/8" = 1'-0"

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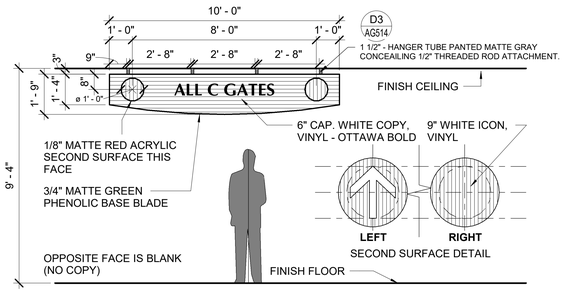
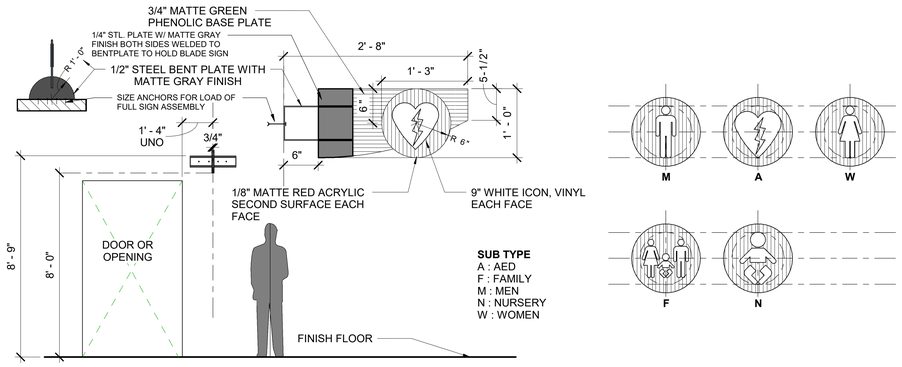


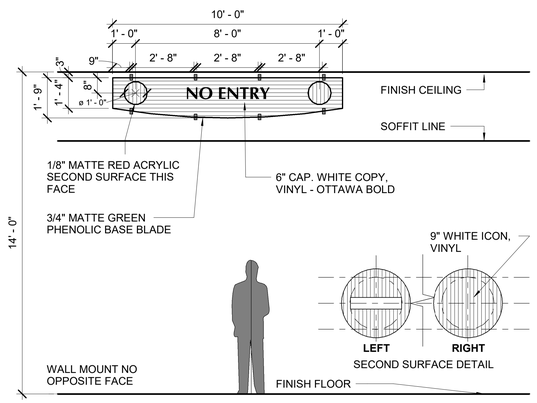
D1 [D1] DOUBLE FACED CEILING MOUNT

3/8" = 1'-0"



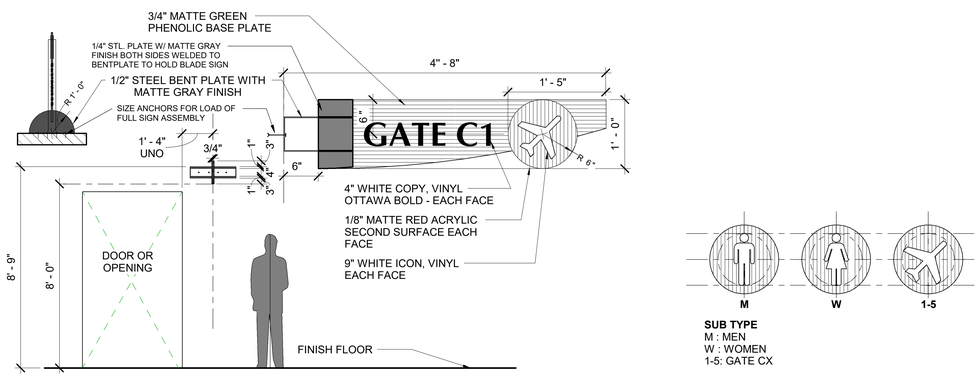
D3 [B2-X] WALL PROJECTION SMALL FORMAT

3/8" = 1'-0"



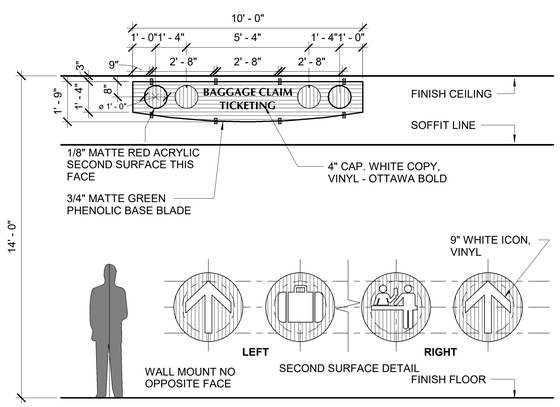
B1 [D3] SINGLE FACED WALL MOUNT

3/8" = 1'-0"



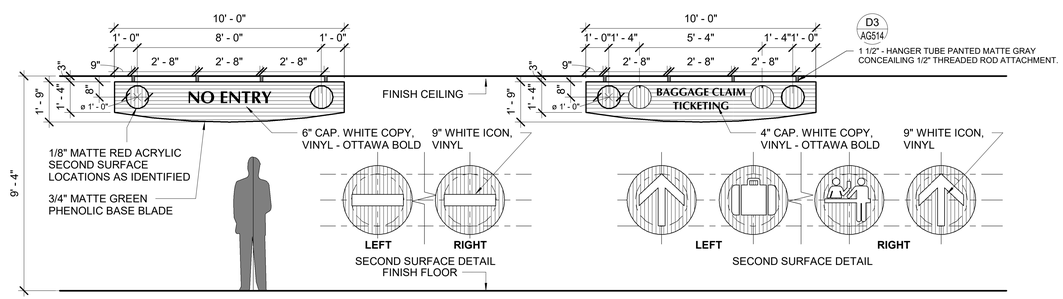
B3 [B-X] WALL PROJECTION

3/8" = 1'-0"



A1 [D4] SINGLE FACED WALL MOUNT

3/8" = 1'-0"



A3 [D2] DOUBLE FACED CEILING MOUNT

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ELEVATION INDEX

D1	B2-X
D3	B-X
D4	D2

SCALE: 3/8" = 1'-0"

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AG512

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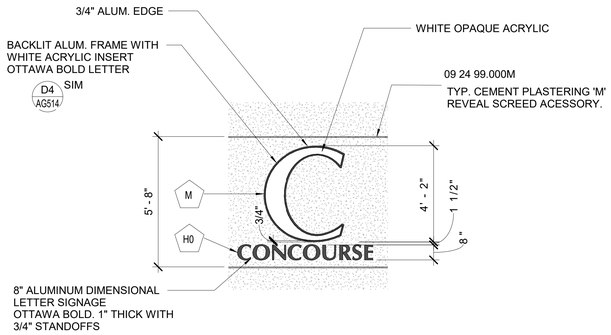
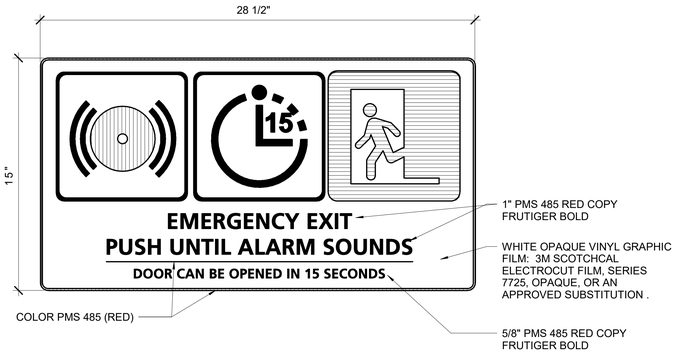


D1 [M][HO] CONCOURSE ENTRY SIGN

3/8" = 1'-0"

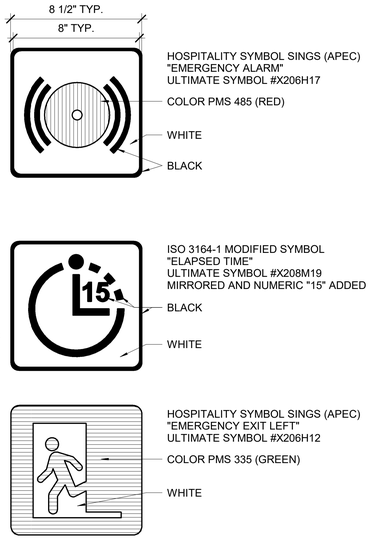


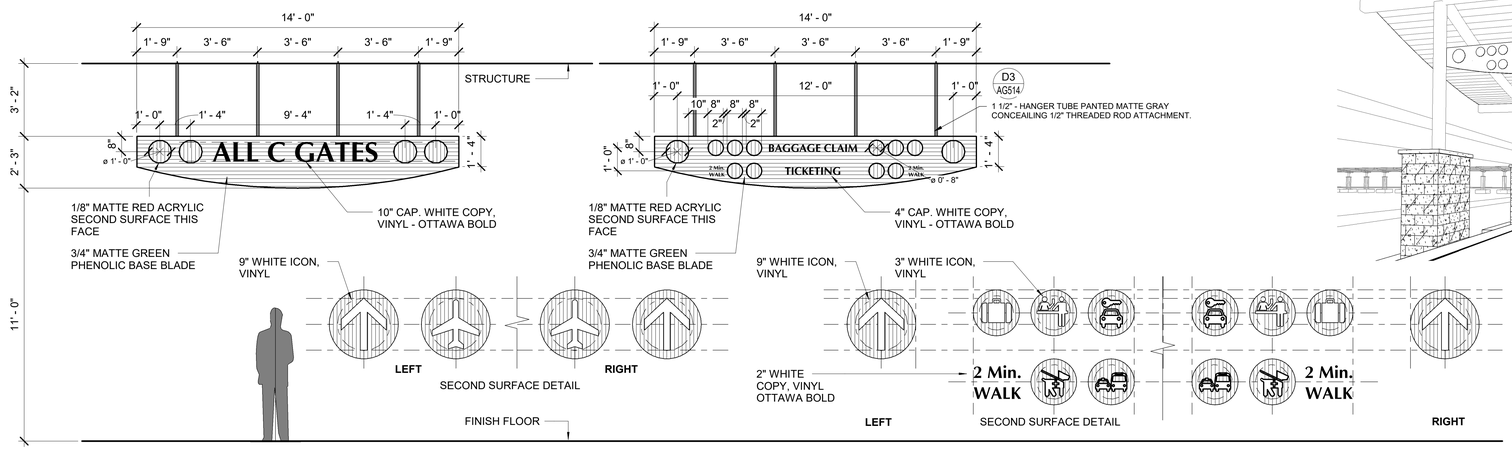
REQUIRED AT EACH DELAYED EGRESS DOOR AS INDICATED ON SHEET **AL211**

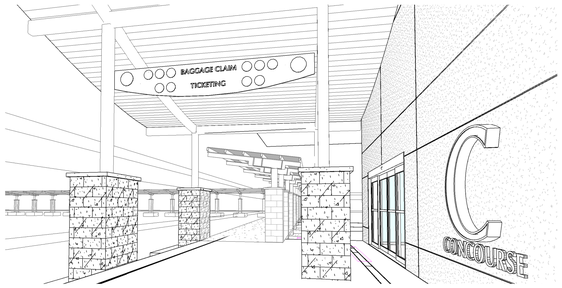
PLACE ABOVE EGRESS DEVICE CENTERED ON DOOR LEAF

D3 [ZD] DELAYED EGRESS PLACARD

3" = 1'-0"

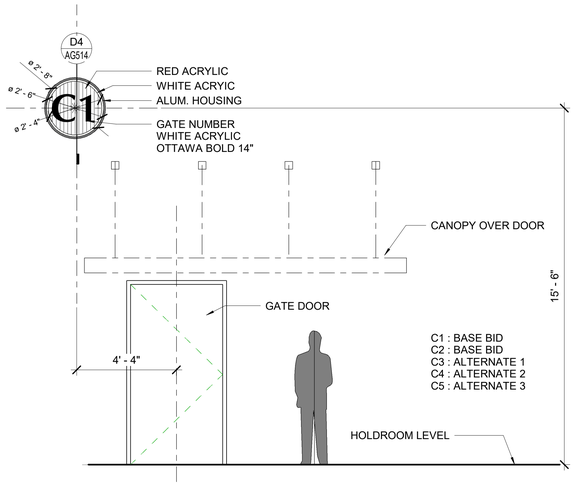






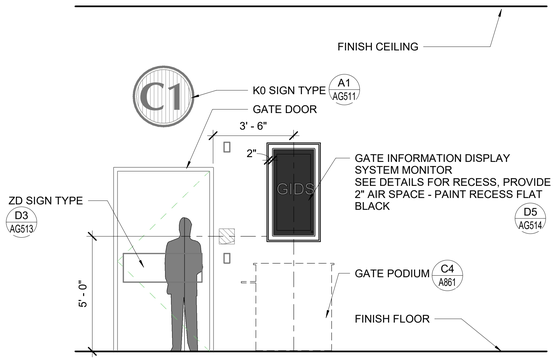
B1 [D14] DOUBLE FACED BLADE

3/8" = 1'-0"



A1 [K1] EXTERIOR GATE IDEN.

3/8" = 1'-0"



A2 [X1] GATE INFO. DISPLAY

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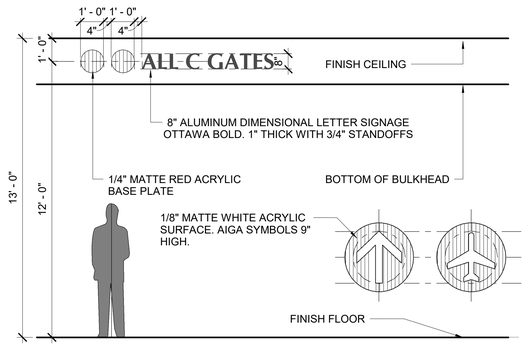

A4 [H1] DIM. LETTERS

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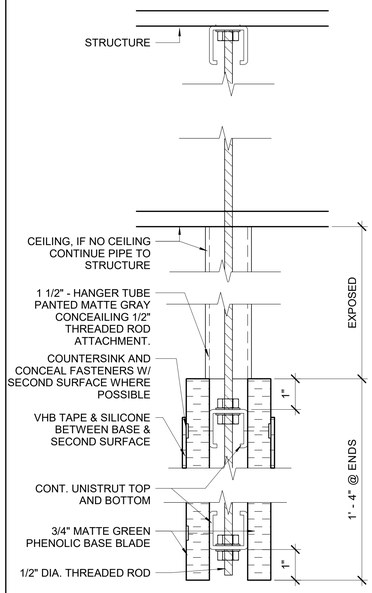
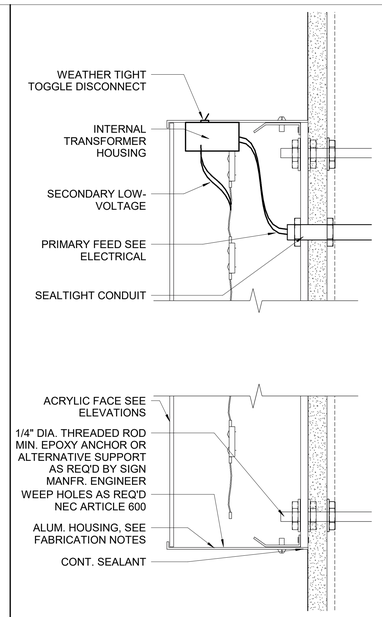
BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt

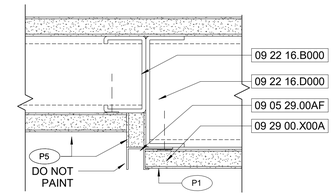
12/8/2020 5:53:30 PM



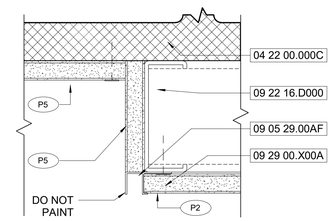
D3 BLADE SIGN
6" = 1'-0"



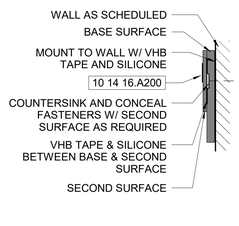
D4 GATE IDENTITY
6" = 1'-0"



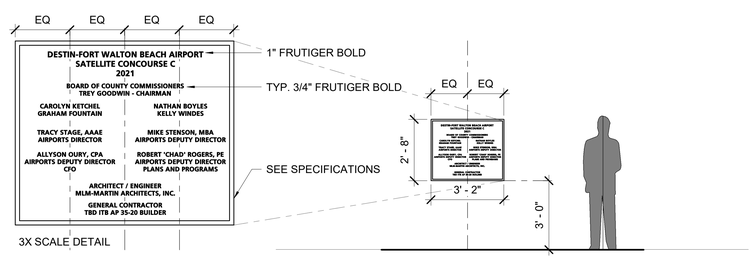
E5 TRIM @ 'X2' TYPE SIGN
6" = 1'-0"



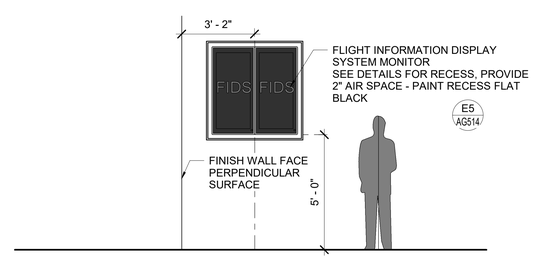
D5 TRIM @ 'X1' TYPE SIGN
6" = 1'-0"



C5 E-F-G SIGN TYPE MOUNT
6" = 1'-0"



A2 [P] DEDICATION PLAQUE
3/8" = 1'-0"



A4 [X2] FIDS DISPLAY
3/8" = 1'-0"

KEYNOTES

NO.	
04 22 00.000C	TYP. 12" NOMINAL CONCRETE MASONRY UNIT
09 05 29.00AF	TYP. ALUMINUM GYPSUM BOARD 'F' REVEAL ACCESSORY.
09 22 16.B000	TYPICAL 2 1/2" GALV. METAL STUD FRAMING @ 24" OC UNO.
09 22 16.D000	TYPICAL 3 5/8" GALV. METAL STUD FRAMING @ 24" OC UNO.
09 29 00.X00A	TYPICAL 5/8" TYPE 'X' GYPSUM WALL BOARD
10 14 16.A200	TYPICAL TACTILE SYMBOL - REFER TO SCHEDULE FOR SYMBOL

NOTES

1. REFER TO **AL641** FOR PARTITION TYPES
2. FOR DOOR TYPES AND SCHEDULES REFER TO SHEET SERIES **A711**
3. REFER TO ELECTRICAL, TELECOM, AV, AND SIGNAGE DRAWINGS FOR OUTLET INFORMATION.
4. REFER TO A SERIES SHEETS FOR DIMENSIONS.
5. AREA DESIGNATED FOR FUTURE WORK (NIC). CONTRACTOR SHALL KEEP THIS AREA CLEAR OF ANY BUILT ELEMENTS ABOVE AND/OR BELOW GROUND UNLESS OTHERWISE NOTED WITHIN THE SCOPE OF THIS PROJECT.
6. ALL GRADE II BRAILLE IS PRESENTED FOR GRAPHIC REPRESENTATION. CONTRACTOR TO COORDINATE WITH FABRICATOR THAT ACTUAL BRAILLE PRODUCED TRANSLATES THE COPY PROVIDED.
7. MESSAGES ILLUSTRATED IN DRAWINGS ARE NOT ACTUAL MESSAGES BUT FOR LAYOUT PURPOSES ONLY. SEE MESSAGE SCHEDULE FOR SPECIFIC MESSAGES. NOTE THAT BID ISSUE OF THE MESSAGE SCHEDULE IS "DRAFT" LEVEL AND IS TO BE UPDATED BY FABRICATOR THROUGHOUT PROJECT CONSTRUCTION SUBMITTAL PROCESS.
8. SIGN LOCATION PLAN SYMBOLS INDICATE GENERAL SIGN LOCATIONS. THEY ARE NOT REPRESENTATIVE OF ACTUAL SIGN SIZES OR OR LOCATIONS. SEE MOUNTING DETALS FOR MOUNTING LOCATION INFORMATION. CONDUCT PRE-CONSTRUCTION MEETING IN FIELD WITH AIRPORT, AND ARCHITECT TO ESTABLISH PROTOTYPICAL LOCATIONS AND HEIGHTS FOR EACH SIGN TYPE.
9. FABRICATOR TO FIELD VERIFY ALL EXISTING CONDITIONS AND THEIR IMPACT ON FINAL SIGN DIMENSIONS PRIOR TO FABRICATION.
10. SUBSTITUTE TYPEFACES, ARROWS OR SYMBOLS WILL NOT BE ACCEPTED. ALL SYMBOLS TO BE STANDARD F.A.A., AIGA, DOT, ANSI, ADA SYMBOLS. IF NECESSARY, CONTACT ARCHITECT FOR INFORMATION ON AVAILABILITY.
11. ALL FASTENERS TO BE CONCEALED AND VANDAL RESISTANT UNLESS OTHERWISE NOTED.
12. FABRICATOR TO BE RESPONSIBLE FOR PULLING ALL PERMITS AND COORDINATING ALL INSPECTIONS REQUIRED IN CONNECTION WITH THE WORK.
13. SIGN LOCATION SYMBOLS IN PLAN ASSIGNED SHOULD BE CROSS REFRENCED TO ELEVATION FOR INDICATION THAT SIGN IS DOUBLE FACED. PROJECTIONS SIGNS ARE ALSO DOUBLE FACED.
14. FABRICATOR SHALL BE RESPONSIBLE FOR PREPARATION OF ITS SUBMITTALS AND PULLING OF ALL NECESSARY PERMITS AND VARIANCES, (IF APPLICABLE), INCLUDING SUBMITTALS FOR OTHER RELATED REVIEW COMMITTEES FOR THIS PROJECT'S JURISDICTION. TASKS ALSO INCLUDE COORDINATION OF ALL INSPECTIONS REQUIRED IN CONNECTION WITH THE WORK.
15. FABRICATOR SHALL BE RESPONSIBLE FOR LAYOUT AND PRODUCTION OF FULL SIZE TEMPLATES FOR ALL DIMENSIONAL LETTERS AND OTHER SPECIALIZED FORMATS. THESE ALSO REQUIRE THE FIELD REVIEW BY OWNER, ARCHITECT AND OTHER DESIGN PROFESSIONALS.
16. FOR SIGNS IN WHICH THE MOUNTING LOCATION IS REQUIRED TO BE ON GLASS, FABRICATOR SHALL PROVIDE VINYL SHEET PRECISION MEASURED TO SIZE OF SIGN AND APPLIED TO REVERSE SIDE OF GLASS. THE VINYL COLOR SHALL MATCH THE COLOR OF THE SIGN. THE SIGN AND ITS DOUBLE FACED TAPE ARE TO BE APPLIED TO THE VIEWING SIDE OF GLASS. THE "BACKER" VINYL SHALL BE OPTICALLY POSITIONED, SO NO "BACKER" VINYL IS SEEN.
17. DETAILS SHOWN ARE DESIGN INTENT ONLY. CONTRACTOR TO PROVIDE SHOP DRAWINGS AND STRUCTURAL CALULATIONS TO BE REVIEWED BY DEIGNER AND AHJ.

COLOR LEGEND

- ALUMINUM ANNODIZED
- MATTHEWS "RED" - [7A-2A] PMS-179C
- BRISTOL "BLUE" - [75A-4A] PMS-5483C
- CASTLE KEEP "GREEN" - [62C-4D] PMS-7475C
- WHITE
- WHITE TEXT U.O.N.

ELEVATION INDEX

P X2

SCALE: 6" = 1'-0"
0 1/2" 1" 2" 4"

SCALE: 3/8" = 1'-0"
0 8" 16" 32" 64"

C19-2811- AP
Construction of Satellite Concourse 'C'

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AA-C002208
ELIGIBLE FOR F.S. 119 PROPERTY
MIGUEL ANTONIO MARTIN
FL AR-98279

SEAL

Revisions

No.	Date	Description

Project No.:	MLM-19672
Designed By:	MAM
Drawn By:	MAM ST CC
Checked By:	MAM MLM
Issue Date:	30-NOV-2020
Drawing Scale:	As indicated

Drawing Title:
SIGN TYPE ELEVATIONS & DETAILS
BID DOCUMENTS

Drawing No.:
AG514

BIM 360://Design of Satellite Concourse/VPS-MLM_A.rvt
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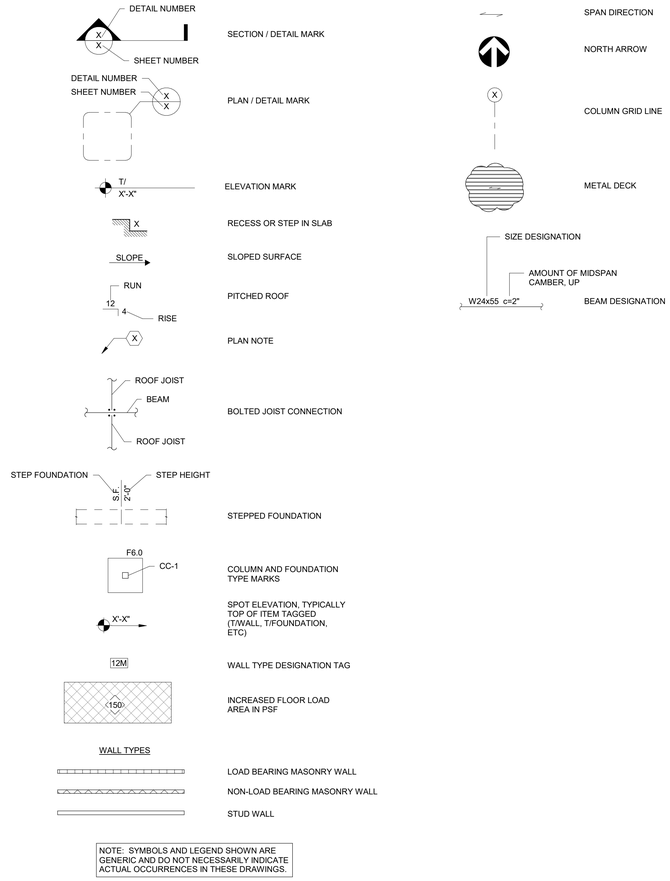
STRUCTURAL ABBREVIATIONS

ACI	AMERICAN CONCRETE INSTITUTE
ADD	ADDITIVE
ADDL	ADDITIONAL
AFF	ABOVE FINISHED FLOOR
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
AISI	AMERICAN IRON AND STEEL INSTITUTE
ALT	ALTERNATE/ALTERNATIVE
ALUM	ALUMINUM
ANCH	ANCHOR
ARCH	ARCHITECTURE/ARCHITECTURAL
ASD	ALLOWABLE STRESS DESIGN
ASTM	AMERICAN SOCIETY OF TESTING MATERIALS
AWS	AMERICAN WELDING SOCIETY
B/	BOTTOM OF
BCX	BOTTOM CHORD EXTENSION
BLDG	BUILDING
BLK	BLOCK
BM	BEAM
BOT	BOTTOM
BP	BASE PLATE/BEARING PLATE
BRG	BEARING
BTWN	BETWEEN
C	CHANNEL
CB	CONCRETE BEAM
CC	CONCRETE COLUMN
CF	CUBIC FEET (FOOT)
CFS	COLD FORMED STEEL
CIP	CAST IN PLACE
CJ	CONTRACTION JOINT OR CONTROL JOINT
CL	CENTERLINE
CLR	CLEAR/CLEARANCE
CM	CONCRETE MASONRY
CMU	CONCRETE MASONRY UNIT
CO	COMPANY
COL	COLUMN
CONC	CONCRETE
CONT	CONTINUOUS
CONN	CONNECTION
CONST	CONSTRUCTION
COORD	COORDINATE
CSJ	CONSTRUCTION JOINT
CTR	CENTER
CTRD	CENTERED
CY	CUBIC YARD
DEPT	DEPARTMENT
DET	DETAIL
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DIST	DISTANCE
DL	DEAD LOAD
DN	DOWN
DWG	DRAWING
EA	EACH
EE	EACH END
EF	EACH FACE
EHPA	EMERGENCY HURRICANE PROTECTION AREA
EJ	EXPANSION JOINT
ELEC	ELECTRIC/ELECTRICAL
EL	ELEV ELEVATION
ENGR	ENGINEER
EOD	EDGE OF DECK
EOR	ENGINEER OF RECORD
EOS	EDGE OF SLAB
EQ SP	EQUAL SPACED
ES	EACH SIDE
EW	EACH WAY
EXIST	EXISTING
EXP	EXPANSION
EXT	EXTERIOR
F	FOUNDATION
FD	FLOOR DRAIN
FDN	FOUNDATION
FF	FINISHED FLOOR
FIN	FINISH
FIN GR	FINISH GRADE
FLR	FLOOR
FS	FAR SIDE
FT	FEET/FOOT
FTG	FOOTING
GA	GAGE/GAUGE
GALV	GALVANIZED
GB	GRADE BEAM
GC	GENERAL CONTRACTOR
GEN	GENERAL
GL	GRID LINE
GS	GALVANIZED STEEL
HD	HOT DIPPED
HDG	HOT DIPPED GALVANIZED
HORIZ	HORIZONTAL
HSA	HEADED STUD ANCHOR
HSS	HOLLOW STRUCTURAL SECTION
HT	HEIGHT
I	MOMENT OF INERTIA
ID	INSIDE DIAMETER
I.F.	INSIDE FACE
IN	INCH
INT	INTERIOR
JST	JOIST
JT	JOINT
K	KIP (1000 LB)
KLF	KIPS PER LINEAL FOOT
KSI	KIPS PER SQUARE INCH
KWY	KEYWAY
L	STEEL ANGLE
LB	POUND
LGTH	LENGTH
LL	LIVE LOAD
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LONG	LONGITUDINAL
LSH	LONG SIDE HORIZONTAL
LSV	LONG SIDE VERTICAL
LT WT	LIGHT WEIGHT
MATL	MATERIAL
MAX	MAXIMUM
MB	MASONRY BEAM
MC	MISCELLANEOUS CHANNEL/MASONRY COLUMN
MECH	MECHANICAL
MET	METAL
MFR	MANUFACTURE/MANUFACTURER
MID	MIDDLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MO	MASONRY OPENING
MPH	MILES PER HOUR
NGVD	NATIONAL GEODETIC VERTICAL DATUM
NIC	NOT IN CONTRACT
NO	NUMBER
NS	NEAR SIDE
NTS	NOT TO SCALE
OC	ON CENTERS
OD	OUTSIDE DIAMETER
O.F.	OUTSIDE FACE
OPNG	OPENING
OPP	OPPOSITE
P/C	PRECAST CONCRETE
PAR	PARALLEL
PCB	PRECAST CONCRETE BEAM
PCF	POUNDS PER CUBIC FEET
PCI	PRECAST/PRESTRESSED CONCRETE INSTITUTE
PEMB	PRE-ENGINEERED METAL BUILDING
PEN	PENETRATION
P.J.	PANEL JOINT CENTERLINE
PL	PLATE
PLF	POUNDS PER LINEAR FOOT
PLMG	PLUMBING
PLY	PLYWOOD
PREFAB	PREFABRICATED
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PT	PRESSURE TREATED
R/W	REINFORCED WITH
RD	ROOF DRAIN
REF	REFERENCE
REINF	REINFORCING
REQD	REQUIRED
REV	REVISION
RFI	REQUEST FOR INTERPRETATION
RTU	ROOF TOP UNIT
SB	SOFFIT BEAM
SCHED	SCHEDULE
S.F.	SQUARE FEET
SF	STRIP FOUNDATION
SIM	SIMILAR
SPC	SPACE/SPACES
SPECS	SPECIFICATIONS
SP	SPECIAL JOIST
SQ	SQUARE
SS	STAINLESS STEEL
STD	STANDARD
STIFF	STIFFENER
STL	STEEL
STRUCT	STRUCTURAL
SYM	SYMMETRICAL
T/	TOP OF
TB	TIE BEAM
TC	TIE COLUMN
T&B	TOP AND BOTTOM
TCX	TOP CHORD EXTENSION
TDS	TURN DOWN SLAB
TE	THICKENED EDGE
TEMP	TEMPERATURE
TENS	TENSION
THD	THREAD/THREADED
THK	THICK
TOL	TOLERANCE
TRANS	TRANSVERSE
TS	TUBE STEEL
T.S.	THICKENED SLAB
TWF	THICKENED WALL FOUNDATION
TYP	TYPICAL
UNO	UNLESS NOTED OTHERWISE
VERT	VERTICAL
VOL	VOLUME
W	WIDE FLANGE SECTION
W/	WITH
W/O	WITHOUT
WD	WOOD
WF	WALL FOOTING
WP	WATERPROOF
W.P.	WORKING POINT
WS	WELDED STUD
WT	WEIGHT
WWF	WELDED WIRE FABRIC
@	AT DESIGNATION
#	POUNDS / REBAR SIZE NUMBER
+/-	PLUS OR MINUS
C.L.	CENTER LINE
&	AND
Sx	SECTION MODULUS
Ix	MOMENT OF INERTIA

STRUCTURAL SYMBOLS AND LEGEND



NOTE: SYMBOLS AND LEGEND SHOWN ARE GENERIC AND DO NOT NECESSARILY INDICATE ACTUAL OCCURRENCES IN THESE DRAWINGS.

STRUCTURAL SHEET INDEX

SHEET #	SHEET TITLE
S001	ABBREVIATIONS SYMBOLS AND SHEET INDEX
S002	STRUCTURAL GENERAL NOTES
S003	STR NOTES CONT. AND COMPONENT WIND CRITERIA
S210	OVERALL STRUCTURAL FLOOR PLANS
S211	ENLARGED FOUNDATION PLAN - AREA 1
S212	ENLARGED FOUNDATION PLAN - AREA 2
S213	ENLARGED FOUNDATION PLAN - AREA 3
S214	ENLARGED FOUNDATION PLAN - AREA 4
S215	ENLARGED FOUNDATION PLAN - AREA 5
S216	ENLARGED FOUNDATION PLAN - AREA 6
S312	BUILDING SECTIONS
S411	ENLARGED ROOF FRAMING PLAN - AREA 1
S412	ENLARGED ROOF FRAMING PLAN - AREA 2
S413	ENLARGED ROOF FRAMING PLAN - AREA 3
S414	ENLARGED ROOF FRAMING PLAN - AREA 4
S415	ENLARGED ROOF FRAMING PLAN - AREA 5
S416	ENLARGED ROOF FRAMING PLAN - AREA 6
S501	FOUNDATION SECTIONS AND DETAILS
S502	MASONRY SECTIONS AND DETAILS
S503	SECTIONS AND DETAILS
S504	SECTIONS AND DETAILS

THIS BUILDING IS CLASSIFIED AS A "THRESHOLD BUILDING" SPECIAL INSPECTION OF THE CONSTRUCTION IS REQUIRED BY THE STATE OF FLORIDA IN ACCORDANCE WITH CHAPTER 553 OF THE FLORIDA STATUTES. CONSTRUCTION SHALL BE INSPECTED IN ACCORDANCE WITH THE SPECIAL INSPECTION PLAN.

OKALOOSA COUNTY

FLY VPS

CI 9-2811-AP
Construction of Satellite Concourse 'C'

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AA-C002208
MLM JOB #: TYPE PROPERTY

Jamese F. Spears, P.E.
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Seal

SEAL

Revisions

No.	Date	Description

TLC ENGINEERING SOLUTIONS
©Copyright 2019
255 S. Orange Avenue
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P 407.841.9050
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TLC No.: 719055
THINK. LISTEN. CREATE.

Key Plan

Project No.:	MLM-19672
Designed By:	JFS
Drawn By:	SVW
Checked By:	JFS
Issue Date:	30-NOV-2020
Drawing Scale:	As indicated

Drawing Title:

ABBREVIATIONS SYMBOLS AND SHEET INDEX

BID DOCUMENTS

Drawing No.:

S001

BIM 360://Design of Satellite Concourse/VPS-MLM-S.rvt
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1000 GENERAL NOTES:

1. STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH PROJECT SPECIFICATIONS AND ARCHITECTURAL, MECHANICAL, ELECTRICAL, PLUMBING, AND SITE DRAWINGS. CONSULT THESE DRAWINGS FOR OPENINGS, DEPRESSIONS, EQUIPMENT WEIGHTS AND LOCATIONS, EMBEDDED ITEMS AND OTHER DETAILS NOT SHOWN ON STRUCTURAL DRAWINGS.
2. DIMENSIONS AND CONDITIONS MUST BE VERIFIED IN THE FIELD. ANY DISCREPANCIES SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER OF RECORD BEFORE PROCEEDING WITH THE AFFECTED PART OF THE WORK.
3. NO STRUCTURAL MEMBER OR COMPONENT SHALL BE CUT, NOTCHED, OR OTHERWISE ALTERED UNLESS APPROVED IN WRITING BY THE ENGINEER OF RECORD. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY AND ALL COSTS INCURRED BY THE ENGINEER OF RECORD FOR REVIEW OF ANY SUCH DEVIATIONS.
4. DO NOT SCALE DRAWINGS.
5. THE STRUCTURE IS DESIGNED TO BE SELF-SUPPORTING AND STABLE AFTER THE BUILDING IS COMPLETE. IT IS THE CONTRACTOR'S RESPONSIBILITY TO DETERMINE ERECTION PROCEDURES AND SEQUENCE TO ENSURE SAFETY OF THE BUILDING AND ITS COMPONENTS DURING ERECTION. THIS INCLUDES THE ADDITION OF NECESSARY SHORING, SHEETING, TEMPORARY BRACING, GUYS OR TIEDOWNS.
6. DETAILS LABELED "TYPICAL DETAILS" ON THE DRAWINGS SHALL APPLY TO ALL SITUATIONS OCCURRING ON THE PROJECT THAT ARE THE SAME OR SIMILAR TO THOSE SPECIFICALLY DETAILED. THE APPLICABILITY OF THE DETAIL TO ITS LOCATION ON THE DRAWINGS CAN BE DETERMINED BY THE TITLE OF DETAIL. SUCH DETAILS SHALL APPLY WHETHER OR NOT THEY ARE REFERENCED AT EACH LOCATION. QUESTIONS REGARDING APPLICABILITY OF TYPICAL DETAILS SHALL BE DETERMINED BY THE ENGINEER OF RECORD.
7. THE GENERAL CONTRACTOR SHALL COMPARE THE ARCHITECTURAL, MECHANICAL, ELECTRICAL, PLUMBING, CIVIL AND STRUCTURAL DRAWINGS AND REPORT ANY DISCREPANCIES BETWEEN EACH SET OF DRAWINGS AND WITHIN EACH SET OF DRAWINGS TO THE ARCHITECT AND ENGINEER OF RECORD PRIOR TO THE FABRICATION AND INSTALLATION OF ANY STRUCTURAL MEMBERS.
8. THE CONTRACT STRUCTURAL DRAWINGS AND SPECIFICATIONS REPRESENT THE FINISHED STRUCTURE, AND DO NOT INDICATE THE METHOD OR MEANS OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, PROCEDURES, TECHNIQUES, SEQUENCE AND SAFETY. THE ENGINEER DOES NOT HAVE CONTROL OR CHARGE OF, AND SHALL NOT BE RESPONSIBLE FOR, CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, OR PROCEDURES, FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK, FOR THE ACTS OR OMISSION OF THE CONTRACTOR, SUBCONTRACTOR OR ANY OTHER PERSONS PERFORMING ANY OF THE WORK, OR FOR THE FAILURE OF ANY OF THEM TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
9. THE STRUCTURAL ENGINEER'S OBLIGATIONS TO REVIEW SHOP DRAWINGS AND OTHER SUBMITTALS AND TO RETURN THEM IN A TIMELY MANNER ARE CONDITIONED UPON THE PRIOR REVIEW AND APPROVAL OF THE SHOP DRAWINGS OR SUBMITTALS BY THE CONTRACTOR AS REQUIRED IN THE CONSTRUCTION CONTRACT AND THE CONTRACTOR'S SUBMITTAL OF THE SHOP DRAWINGS AND OTHER SUBMITTALS IN ACCORDANCE WITH A WRITTEN SCHEDULE DISTRIBUTED IN ADVANCE TO THE ENGINEER IDENTIFYING THE DATES FOR THE SUBMITTAL OF THE VARIOUS SHOP DRAWINGS AND SUBMITTALS.
10. PERIODIC SITE OBSERVATION BY FIELD REPRESENTATIVES OF TLC ENGINEERING FOR ARCHITECTURE IS SOLELY FOR THE PURPOSE OF DETERMINING IF THE WORK OF THE CONTRACTOR IS PROCEEDING IN GENERAL ACCORDANCE WITH THE STRUCTURAL CONTRACT DOCUMENTS. THIS LIMITED SITE OBSERVATION SHALL NOT BE CONSTRUED AS EXHAUSTIVE OR CONTINUOUS TO CHECK THE QUALITY OR QUANTITY OF THE WORK.
11. ALL STRUCTURES REQUIRE PERIODIC MAINTENANCE TO EXCEED LIFE SPAN AND TO ENSURE STRUCTURAL INTEGRITY FROM EXPOSURE TO THE ENVIRONMENT. A PLANNED PROGRAM OF MAINTENANCE SHALL BE ESTABLISHED BY THE OWNER. THIS PROGRAM SHALL INCLUDE ITEMS SUCH AS, BUT NOT LIMITED TO, PAINTING OF STRUCTURAL STEEL, PROTECTIVE COATINGS FOR CONCRETE, SEALANTS, CAULKED JOINTS, EXPANSION JOINTS, CONTROL JOINTS, SPALLS AND CRACKS IN CONCRETE, AND PRESSURE WASHING OF EXPOSED STRUCTURAL ELEMENTS EXPOSED TO SALT ENVIRONMENT OR OTHER HARSH CHEMICALS.
12. STRUCTURAL ENGINEER OF RECORD IS NOT RESPONSIBLE FOR THE DESIGN OF STEEL STAIRS, HANDRAILS, CURTAIN WALL/WINDOW WALL SYSTEMS, COLD-FORMED STEEL FRAMING, OR OTHER SYSTEMS NOT SHOWN IN THE STRUCTURAL DOCUMENTS. SUCH SYSTEMS SHALL BE DESIGNED, FURNISHED, AND INSTALLED AS REQUIRED BY OTHER PORTIONS OF THE CONTRACT DOCUMENTS.
13. IN THE PROFESSIONAL OPINION OF TLC ENGINEERING FOR ARCHITECTURE, INC. THE STRUCTURAL CONTRACT DOCUMENTS FOR THIS PROJECT HAVE BEEN PREPARED IN ACCORDANCE WITH THE DESIGN CRITERIA AS SET FORTH IN THE **FLORIDA BUILDING CODE (FBC) 6th EDITION (2017), 2014 EDITION 2015 INTERNATIONAL BUILDING CODE (IBC).** ENGINEER TO SELECT APPLICABLE BUILDING CODE**
14. NO PROVISIONS HAVE BEEN MADE FOR VERTICAL OR HORIZONTAL EXPANSION EXCEPT AS SHOWN ON CONTRACT DOCUMENTS.
15. FINISH FLOOR ELEVATION (FIRST FLOOR) OF 0'-0" IS USED AS A REFERENCE ELEVATION. ACTUAL FLOOR ELEVATION IS + 86.25'. SEE CIVIL DRAWINGS FOR ACTUAL ELEVATION.
16. THE USE OF REPRODUCTIONS OF THESE CONTRACT DOCUMENTS AND USE OF CAD/REVIT FILES BY ANY CONTRACTOR, SUBCONTRACTOR, ERECTOR, FABRICATOR OR MATERIAL SUPPLIER IN LIEU OF PREPARATION OF SHOP DRAWINGS IS PROHIBITED UNLESS PRIOR WRITTEN APPROVAL IS OBTAINED FROM ENGINEER OF RECORD.
17. IN THE EVENT THAT THE STRUCTURAL CONTRACTS DRAWINGS AND SPECIFICATIONS CONFLICT ON INFORMATION, THE STRUCTURAL CONTRACT DRAWINGS SHALL SUPERSEDE THE SPECIFICATIONS.

1060 DESIGN LOADS:

1. THE STRUCTURAL SYSTEM FOR THIS BUILDING HAS BEEN DESIGNED IN ACCORDANCE WITH THE FLORIDA BUILDING CODE, 6TH EDITION (2017) AND AS SUPPLEMENTED BY LOCAL AMENDMENTS.
2. THE FOLLOWING SUPERIMPOSED LOADINGS HAVE BEEN UTILIZED:

   A. DEAD LOADS:

ROOF	20 PSF

   B. LIVE LOADS:

ROOF	20 PSF
FLOOR	100 PSF
TSA EQUIPMENT	100 PSF
SCISSOR LIFT	3.2 K MAX TOTAL WEIGHT
VEHICLES DISPLAYED IN HOLD ROOMS	6 K MAX TOTAL WEIGHT (ONE ONLY)

   C. WIND LOADS: PER FLORIDA BUILDING CODE, SECTION 1609

   SEE SHEET S003 FOR COMPONENTS AND CLADDING PRESSURES

ULTIMATE DESIGN WIND SPEED, Vult	154 MPH (3 SEC. GUST)
NOMINAL DESIGN WIND SPEED, Vasd	119 MPH (3 SEC. GUST)
RISK CATEGORY	III
EXPOSURE	C

1330 SHOP DRAWING REVIEW:

1. SHOP DRAWINGS SHALL ADEQUATELY DEPICT THE STRUCTURAL ELEMENTS AND CONNECTIONS SHOWN ON THE CONTRACT DOCUMENTS. SHOP DRAWINGS WILL BE REVIEWED FOR GENERAL COMPLIANCE WITH THE DESIGN INTENT OF THE CONTRACT DOCUMENTS ONLY. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO VERIFY COMPLIANCE WITH THE CONTRACT DOCUMENTS AS TO QUANTITY, LENGTH, ELEVATIONS, DIMENSIONS, ETC. REVIEW OF SUBMITTALS AND SHOP DRAWINGS DOES NOT RELIEVE THE CONTRACTOR OF FULL RESPONSIBILITY FOR ERRORS AND OMISSIONS ASSOCIATED WITH THE PREPARATION OF THE SHOP DRAWINGS.
2. SHOP DRAWINGS SHALL BE REVIEWED BY THE CONTRACTOR AND MARKED "APPROVED" PRIOR TO SUBMITTAL TO THE ARCHITECT/ENGINEER. NON-CONFORMING DRAWING SUBMITTALS WILL BE RETURNED WITHOUT REVIEW.
3. SHOP DRAWING SUBMITTALS SHALL EITHER BE SUBMITTED ELECTRONICALLY OR SHALL INCLUDE, AT A MINIMUM, FOUR HARD COPIES. ONE SET OF PRINTS WILL BE RETAINED BY THE ENGINEER OF RECORD, ONE BY THE ARCHITECT, ONE BY THE LOCAL BUILDING DEPARTMENT (WHERE REQUIRED) AND THE CONTRACTOR SHALL MAKE PRINTS AS REQUIRED FOR DISTRIBUTION.
4. THE CONTRACT DOCUMENTS WILL GOVERN OVER THE SHOP DRAWINGS UNLESS OTHERWISE SPECIFIED IN WRITING BY THE ENGINEER OF RECORD.
5. CHANGES AND ADDITIONS MADE ON RE-SUBMITTALS SHALL BE CLEARLY FLAGGED AND NOTED. THE PURPOSE OF THE RE-SUBMITTALS SHALL BE CLEARLY NOTED ON THE LETTER OF TRANSMITTAL. ARCHITECT/ENGINEER OF RECORD REVIEW WILL BE LIMITED TO THOSE ITEMS CAUSING THE RE-SUBMITTAL. CONTRACTOR IS RESPONSIBLE FOR COSTS CAUSED BY MULTIPLE RE-SUBMITTALS (MORE THAN ONE) AT ARCHITECT/ENGINEERS' CURRENT HOURLY RATES.

1070 SPECIAL INSPECTIONS

1. THIS BUILDING IS CLASSIFIED AS A "THRESHOLD BUILDING".
2. SPECIAL INSPECTION OF THE CONSTRUCTION IS REQUIRED BY THE STATE OF FLORIDA IN ACCORDANCE WITH CHAPTER 553 OF THE FLORIDA STATUTES. CONSTRUCTION SHALL BE INSPECTED IN ACCORDANCE WITH THE SPECIAL INSPECTION PLAN SUBMITTED TO THE LOCAL AUTHORITY HAVING JURISDICTION. THE SPECIAL INSPECTION PLAN IS PART OF THE PERMIT DOCUMENTS.
3. SPECIAL INSPECTIONS REQUIRED FOR THE FOLLOWING MATERIALS, SYSTEMS, COMPONENTS, AND WORK IN ACCORDANCE WITH THE THRESHOLD INSPECTION PLAN:
   A. STRUCTURAL STEEL
   B. WELDING/BOLTING
   C. METAL DECK
   D. COLD-FORMED STEEL
   E. CAST-IN-PLACE CONCRETE
   F. MASONRY
   G. POST INSTALLED ANCHORS
   H. FOUNDATIONS - SOIL
4. FREQUENCY AND SCOPE OF THRESHOLD INSPECTIONS SHALL BE IN ACCORDANCE WITH THE THRESHOLD INSPECTION PLAN.
5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING AND SCHEDULING ALL SPECIAL INSPECTIONS.
6. THRESHOLD INSPECTION REPORTS SHALL BE SUBMITTED TO THE BUILDING OFFICIAL, EOR, AND OWNER SIGNED AND SEALED BY THE SPECIAL INSPECTOR.
7. THE CONTRACTOR SHALL BEAR THE COST OF CORRECTING AND/OR REPLACING ALL MATERIALS, SYSTEMS, COMPONENTS, AND/OR WORK THAT DOES NOT MEET THE REQUIREMENTS OF THE SPECIAL INSPECTOR.

1331 SHOP DRAWINGS FOR SPECIALTY ENGINEERED PRODUCTS:

1. THE FOLLOWING SYSTEMS AND COMPONENTS AS A MINIMUM REQUIRE FABRICATION AND ERECTION DRAWINGS PREPARED BY A DELEGATED ENGINEER:
   A. COLD FORMED STEEL EXTERIOR OR LOAD BEARING WALL SYSTEMS
   B. CURTAIN WALL SYSTEMS
   C. PREFABRICATED STEEL STAIRS & RAILINGS
   D. OPEN WEB STEEL JOISTS
   E. STRUCTURAL STEEL CONNECTIONS REQUIRING ENGINEERING
   F. METAL ROOF DECK ASSEMBLIES
2. SUBMITTALS SHALL CLEARLY IDENTIFY THE SPECIFIC PROJECT AND APPLICABLE CODES, LIST THE DESIGN CRITERIA, AND SHOW ALL DETAILS AND DRAWINGS NECESSARY FOR PROPER FABRICATION AND INSTALLATION. SHOP DRAWINGS AND CALCULATIONS SHALL IDENTIFY SPECIFIC PRODUCT UTILIZED. GENERIC PRODUCTS WILL NOT BE ACCEPTED.
3. SHOP DRAWINGS AND CALCULATIONS SHALL BE PREPARED UNDER THE DIRECT SUPERVISION AND CONTROL OF THE DELEGATED ENGINEER.
4. SHOP DRAWINGS AND CALCULATIONS SHALL BE SIGNED AND SEALED BY AN ENGINEER REGISTERED IN THE STATE OF FLORIDA (IN WHICH THE PROJECT RESIDES). COMPUTER PRINTOUTS ARE AN ACCEPTABLE SUBSTITUTE FOR MANUAL COMPUTATIONS PROVIDED THEY ARE ACCOMPANIED BY SUFFICIENT DESCRIPTIVE INFORMATION TO PERMIT THEIR PROPER EVALUATION. SUCH DESCRIPTIVE INFORMATION SHALL BE SIGNED AND SEALED BY AN ENGINEER REGISTERED IN THE STATE OF FLORIDA (IN WHICH THE PROJECT RESIDES) AS AN INDICATION THAT HE/SHE HAS ACCEPTED RESPONSIBILITY FOR THE RESULTS. THE STRUCTURAL ENGINEER WILL RETAIN ONE SIGNED AND SEALED SET FOR THEIR RECORDS.
5. DRAWINGS PREPARED SOLELY TO SERVE AS A GUIDE FOR FABRICATION AND INSTALLATION (SUCH AS REINFORCING STEEL SHOP DRAWINGS OR STRUCTURAL STEEL ERECTION DRAWINGS) AND REQUIRING NO ENGINEERING, DO NOT REQUIRE THE SEAL OF A DELEGATED ENGINEER.
6. CATALOG INFORMATION ON STANDARD PRODUCTS DOES NOT REQUIRE THE SEAL OF A DELEGATED ENGINEER.
7. REVIEW BY THE STRUCTURAL ENGINEER OF RECORD OF SUBMITTALS IS LIMITED TO VERIFYING THE FOLLOWING:
   A. THAT THE SPECIFIED STRUCTURAL SUBMITTALS HAVE BEEN FURNISHED.
   B. THAT THE STRUCTURAL SUBMITTALS HAVE BEEN SIGNED AND SEALED BY THE DELEGATED ENGINEER.
   C. THAT THE DELEGATED ENGINEER HAS UNDERSTOOD THE DESIGN INTENT AND HAS USED THE SPECIFIED STRUCTURAL CRITERIA. NO DETAILED CHECK OF CALCULATIONS WILL BE MADE.
   D. THAT THE CONFIGURATION SET FORTH IN THE STRUCTURAL SUBMITTALS IS CONSISTENT WITH THE CONTRACT DOCUMENTS. NO DETAILED CHECK OF DIMENSIONS OR QUANTITIES WILL BE MADE.
8. SUBMITTALS NOT MEETING THE ABOVE CRITERIA WILL NOT BE REVIEWED AND WILL BE RETURNED.

1333 SUBMITTALS:

1. ALL SHOP DRAWINGS MUST BE REVIEWED AND STAMPED APPROVED BY THE GENERAL CONTRACTOR PRIOR TO SUBMITTAL.
2. THE GENERAL CONTRACTOR SHALL SUBMIT FOR ENGINEER REVIEW SHOP DRAWINGS FOR THE FOLLOWING ITEMS:
   - ITEMS MARKED (D) SHALL HAVE SHOP DRAWINGS SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF FLORIDA.
   - ITEMS MARKED (#) SHALL BE SUBMITTED FOR ENGINEER'S RECORD ONLY.

   A. STRUCTURAL STEEL (D)
   B. REINFORCING STEEL
   C. STEEL AND PRECAST CONCRETE STAIRS (D)
   D. METAL ROOF OR FORM DECK
   E. COMPOSITE METAL DECK
   F. COLD-FORMED STEEL FRAMING (D)
   G. CONCRETE MIX DESIGNS
   H. CONSTRUCTION JOINT LOCATIONS IN STRUCTURAL FLOORS
   I. CURTAIN WALL SYSTEMS (D)
   J. MECHANICAL ANCHORS (#)
   K. CHEMICAL (ADHESIVE) ANCHORS (#)
   L. OPEN WEB STEEL JOISTS (D)
   M. POST-INSTALLED ADHESIVE ANCHORS (#)
   N. POST-INSTALLED MECHANICAL ANCHORS (#)
3. MANUFACTURER'S LITERATURE. SUBMIT TWO COPIES OF MANUFACTURER'S LITERATURE FOR ALL MATERIALS AND PRODUCTS USED IN CONSTRUCTION ON THE PROJECT.

1334 REQUEST FOR INTERPRETATION:

1. RFI SHALL ORIGINATE WITH CONTRACTOR AND SHALL BE SUBMITTED IN THE FORM SPECIFIED WITHIN CONTRACT DOCUMENTS. RFI SHALL BE SUBMITTED IN A PROMPT MANNER AS TO AVOID DELAYS IN CONTRACTORS WORK.
2. RFI SHALL BE SUBMITTED AS SPECIFIED WITHIN THE CONTRACT DOCUMENTS AND SHALL BE FORWARDED TO THE ENGINEER VIA THE ARCHITECT OR DIRECTLY TO THE ENGINEER BY THE CONTRACTOR WHEN APPROVED BY THE ARCHITECT.
3. ENGINEER SHALL TAKE UP TO 5 BUSINESS DAYS TO REVIEW AND RETURN RFI'S. HOWEVER, THE ENGINEER WILL ATTEMPT TO EXPEDITE THE REVIEW OF ALL RFI'S WITHIN A REASONABLE TIME FRAME.
4. RFI RESPONSES ARE NOT INTENDED TO AUTHORIZE ANY INCREASE IN CONSTRUCTION COST, SCHEDULE OR TIME EXTENSIONS, OR CONSTRUCTION IN CONFLICT WITH ANY APPLICABLE CODES OR SPECIFIED DESIGN STANDARDS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO NOTIFY THE DESIGN TEAM IMMEDIATELY OF ANY PERCEIVED SCOPE, SCHEDULE, OR COST IMPACTS OR ADJUSTMENTS. IF CONTRACTOR REQUESTS ANY ADDITIONAL COST, INCREASE IN SCHEDULE OR ADJUSTMENT IN SCOPE, THE CONTRACTOR SHALL NOT PROCEED WITH ADDITIONAL WORK UNTIL APPROVED IN WRITING BY THE CONSTRUCTION ADMINISTRATOR.

2310 FOUNDATIONS:

1. SEE THE FOLLOWING GEOTECHNICAL REPORT FOR COMPLETE GEOTECHNICAL RECOMMENDATIONS AND INSTALLATION PROCEDURES. SITE PREPARATION AND FOUNDATION INSTALLATION SHALL COMPLY WITH:

REPORT No.	07832840
PREPARED BY:	PROFESSIONAL SERVICE INDUSTRIES. INC
TITLED:	REPORT OF GEOTECHNICAL ENGINEERING SERVICES, NEW VPS CONCOURSE
DATED:	AUGUST 8, 2019

2. FOLLOW THE RECOMMENDATIONS LISTED IN THE GEOTECHNICAL REPORT FOR SITE PREPARATION WORK. AT A MINIMUM, SITE PREPARATION WORK SHALL INCLUDE:
3. SLABS ON GRADE SHALL BE PLACED OVER A 15 MIL, CLASS "A" VAPOR RETARDER. VAPOR RETARDER SHALL BE LAPPED A MINIMUM OF 6", OR AS RECOMMENDED BY THE MANUFACTURER (WHICHEVER IS GREATER) AND TAPED AT ALL JOINTS. ALL PUNCTURES IN THE VAPOR RETARDER SHALL BE REPAIRED PER MANUFACTURER'S WRITTEN INSTRUCTIONS. ALL PENETRATIONS THROUGH THE VAPOR RETARDER (COLUMNS, PLUMBING, CONDUITS, ETC) SHALL BE SEALED PER MANUFACTURER'S WRITTEN INSTRUCTIONS. VAPOR RETARDER SHALL BE CONTINUOUS UNDER WALL FOUNDATIONS OR SEALED TO EXTERIOR WALLS PER MANUFACTURER'S WRITTEN INSTRUCTIONS.
4. FOUNDATION DESIGN IS BASED ON AN ALLOWABLE BEARING PRESSURE OF 2,000 PSF.

3302 CONCRETE:

1. SHALL BE PER AN APPROVED MIX DESIGN PROPORTIONED TO ACHIEVE A STRENGTH AT 28 DAYS AS LISTED BELOW WITH A PLASTIC AND WORKABLE MIX:

****ENGINEER TO EDIT CONC STRENGTH AND W/C RATION BASED ON EXPOSURE AND USE****

CONCRETE STRUCTURE TYPE	COMPRESSIVE STRENGTH	SLUMP	COARSE AGGREGATE	MAXIMUM W/C RATIO
FOUNDATIONS	3000 PSI	4-6"	1"	0.50
SLABS-ON-GRADE	3000 PSI	4-6"	3/4"	0.50
BEAMS	4000 PSI	4-6"	3/8"	0.48

2. CONCRETE SHALL BE PLACED AND CURED ACCORDING TO ACI STANDARDS AND SPECIFICATIONS.
3. SUBMIT PROPOSED MIX DESIGN WITH RECENT FIELD CYLINDER OR LAB TESTS FOR REVIEW PRIOR TO USE. MIX SHALL BE UNIQUELY IDENTIFIED BY MIX NUMBER OR OTHER POSITIVE IDENTIFICATION. MIX SHALL MEET THE REQUIREMENTS OF ASTM C33 FOR COARSE AGGREGATE.
4. CONCRETE SHALL COMPLY WITH THE REQUIREMENTS OF ASTM STANDARD C94 FOR MEASURING, MIXING, TRANSPORTING, ETC. CONCRETE TICKETS SHALL BE TIME STAMPED WHEN CONCRETE IS BATCHED.
5. THE MAXIMUM TIME ALLOWED FROM THE TIME THE MIXING WATER IS ADDED UNTIL IT IS DEPOSITED IN ITS FINAL POSITION SHALL NOT EXCEED ONE AND ONE HALF (1-1/2) HOURS. IF FOR ANY REASON THERE IS A LONGER DELAY THAN THAT STATED ABOVE, THE CONCRETE SHALL BE DISCARDED. IT SHALL BE THE RESPONSIBILITY OF THE TESTING LAB TO NOTIFY THE OWNER'S REPRESENTATIVE AND THE CONTRACTOR OF ANY NONCOMPLIANCE WITH THE ABOVE.
6. SLABS SHALL BE CURED USING A DISSIPATING CURING COMPOUND MEETING ASTM STANDARD C309 TYPE 1-CLASS D AND SHALL HAVE A FUGITIVE DYE. THE COMPOUND SHALL BE PLACED AS SOON AS THE FINISHING IS COMPLETED OR AS SOON AS THE WATER HAS LEFT THE UNFINISHED CONCRETE. SCUFFED OR BROKEN AREAS IN THE CURING MEMBRANE SHALL BE RECOATED DAILY.
7. CALCIUM CHLORIDES SHALL NOT BE UTILIZED; OTHER ADMIXTURES MAY BE USED ONLY WITH THE APPROVAL OF THE ENGINEER.
8. CONCRETE MIX DESIGNS SHALL INCLUDE A WRITTEN DESCRIPTION INDICATING WHERE EACH PARTICULAR MIX IS TO BE PLACED WITHIN THE STRUCTURE.
9. CONDUITS, PIPES AND SLEEVES SHALL BE PLACED AND SPACED IN ACCORDANCE WITH ACI 318, 6.3.
10. CONCRETE DESIGN MIX SUBMITTALS SHALL INCLUDE TESTED, STATISTICAL BACK-UP DATA AS PER CHAPTER 5 OF ACI 318.

3310 REINFORCING STEEL:

1. SHALL BE ASTM A615 GRADE 60 DEFORMED BARS, FREE FROM OIL, SCALE AND RUST, AND PLACED IN ACCORDANCE WITH THE TYPICAL BENDING DIAGRAM AND PLACING DETAILS OF ACI STANDARDS AND SPECIFICATIONS.
2. PROVIDE CONCRETE COVER OVER PRIMARY REINFORCEMENT, TIES, AND STIRRUPS, AS FOLLOWS, UNLESS OTHERWISE NOTED:

LOCATION AND CONDITION	MINIMUM COVER
A. CONCRETE CAST AGAINST AND PERMANENTLY EXPOSED TO EARTH	ALL BARS 3"
B. CONCRETE EXPOSED TO EARTH OR WEATHER	#6 OR GREATER 2" #5 OR SMALLER 1.5"
C. CONCRETE NOT EXPOSED TO WEATHER OR IN CONTACT WITH GROUND	
1. SLABS	#11 OR SMALLER 3/4"
2. BEAMS	ALL BARS 1.5"

3. SECURE APPROVAL OF SHOP DRAWINGS PRIOR TO COMMENCING FABRICATION.
4. PROVIDE STANDARD HOOKS AT DISCONTINUOUS ENDS OF ALL TOP BARS.
5. WHERE REINFORCING IS SHOWN CONTINUOUS, SPLICE BOTTOM BARS OVER SUPPORTS AND TOP BARS AT CENTER OF SPAN. ALL OTHER LAP SPLICES SHALL BE IN ACCORDANCE WITH SPLICE TABLES AND DETAILS SHOWN ON DRAWINGS.
6. LENGTH OF LAP SPLICES AND BAR EMBEDMENT SHALL BE AS SHOWN IN TABLE, UNLESS OTHERWISE NOTED:

	BAR SIZE	3000 PSI	4000 PSI
T<12"	#6 OR LESS	57 Db	49 Db
T>12"	#6 OR LESS	74 Db	65 Db

   WHERE "T" IS DEPTH OF CONCRETE UNDER BARS AND "Db" IS BAR DIAMETER. UTILIZE CLASS "B" SPLICE FOR ALL SPLICES, U.N.O. ON PLANS OR DETAILS.
7. WHERE HOOKS ARE SHOWN ON THE PLANS OR DETAILS, HOOKS SHALL BE DETAILED TO EXTEND DEEP ENOUGH INTO SUPPORTING STRUCTURE TO DEVELOP THE FULL STRENGTH OF THE HOOKED BAR. PROVIDE ADDITIONAL TIES OR STIRRUPS IN SUPPORTING STRUCTURE AS REQUIRED TO SATISFY ACI 318 HOOK DEVELOPMENT, CONFINEMENT, AND ANCHORAGE CRITERIA.

3314 WELDED WIRE FABRIC:

1. SHALL CONFORM TO ASTM A-185, FREE FROM OIL, SCALE AND RUST AND PLACED IN ACCORDANCE WITH THE TYPICAL PLACING DETAILS OF ACI STANDARDS AND SPECIFICATIONS.
2. MINIMUM LAP SHALL BE ONE SPACE PLUS TWO INCHES.
3. USE OF FLAT MANUFACTURED SHEETS IS REQUIRED (NO ROLLS).
4. INSTALL WWF ON BRICKS OR BOLSTERS AT MID DEPTH OF SLAB U.N.O.; SPACING OF SUPPORTS SHALL BE ADEQUATE TO PREVENT SHIFTING OF WWF DURING CONSTRUCTION, BUT SHALL NOT EXCEED 24" O.C.

4810 MASONRY WALLS:

1. ALL MASONRY CONSTRUCTION SHALL CONFORM TO TMS 402 "BUILDING CODE REQUIREMENTS FOR MASONRY STRUCTURES" AND TMS 602 "SPECIFICATION FOR MASONRY STRUCTURES", LATEST EDITION.
2. MASONRY UNITS SHALL MEET ASTM C-90 FOR HOLLOW LOAD BEARING TYPE MASONRY WITH UNIT STRENGTH OF 2000 PSI ON THE NET AREA (f'm = 2000 PSI). MORTAR SHALL BE TYPE "M" OR "S" AND MEET ASTM C-270.
3. GROUT SHALL BE 3000 PSI MINIMUM COMPRESSIVE STRENGTH AND MEET ASTM C-476 AND HAVE A SLUMP BETWEEN 8" AND 11" WITH WATER CM RATIO OF 0.55 MAXIMUM AND WITH 3/8" MAXIMUM AGGREGATE.
4. PROVIDE HOOKED DOWELS IN FOUNDATIONS FOR VERTICAL REINFORCING ABOVE. LAP SPLICES SHALL BE PER LAP SPLICE SCHEDULE SHOWN IN TYPICAL DETAIL.
5. BLOCK CELLS SHALL BE GROUT FILLED WITH VERTICAL REINFORCING BARS AT CORNERS, INTERSECTIONS, EACH SIDE OF OPENINGS AND AS SHOWN ON THE DRAWINGS.
6. DOWELS SHALL BE USED TO PROVIDE CONTINUITY INTO THE STRUCTURE ABOVE AND/OR BELOW, UNLESS NOTED OTHERWISE.
7. USE METAL LATH, MORTAR OR SPECIAL UNITS TO CONFINE CONCRETE AND GROUT TO AREA AS REQUIRED.
8. MASONRY SHALL BE LAID IN RUNNING BOND PATTERN UNLESS NOTED OTHERWISE. AT FILLED CELLS LAY UNITS WITH FULL BED JOINTS AROUND CELLS.
9. PROVIDE 3/16" WITH 12" CMU GALVANIZED HORIZONTAL JOINT REINFORCING (DUR-O-WALL OR ENGINEER APPROVED SUBSTITUTION) AT ALTERNATE BLOCK COURSES. LADDER TYPE IS RECOMMENDED WITH REINFORCED FILLED CELLS. PROVIDE PREFABRICATED "TEE" OR CORNER SECTIONS AT WALL INTERSECTIONS.
10. CONTROL JOINTS SHALL BE CONSTRUCTED IN CONCRETE MASONRY CONSTRUCTION AT A MAXIMUM HORIZONTAL SPACING BETWEEN JOINTS OF 25'-0" AND NOT MORE THAN 12'-6" FROM CORNERS. SEE ARCHITECTURAL DRAWINGS FOR EXACT LOCATIONS. CONSTRUCT INTERIOR CONTROL JOINTS AT A MAXIMUM HORIZONTAL SPACING OF 32'-0" OR 16'-0" FROM CORNERS. NO JOINTS SHALL BE LOCATED WITHIN 2'-0" OF STEEL BEAM BEARINGS. HORIZONTAL WALL REINFORCING SHALL BE STOPPED EACH SIDE OF CONTROL JOINTS. SEE ARCHITECTURAL DRAWINGS FOR SEALANT REQUIREMENTS AT CONTROL JOINTS.
11. SUBMIT PROPOSED GROUT MIX DESIGNS FOR REVIEW PRIOR TO USE. MIX NUMBER OR OTHER POSITIVE IDENTIFICATION SHALL UNIQUELY IDENTIFY MIX.
12. USE OF SUPERPLASTICIZER IS PROHIBITED.
13. CELLS TO BE GROUT FILLED SHALL HAVE VERTICAL ALIGNMENT SUFFICIENT TO MAINTAIN A CLEAR, UNOBSTRUCTED, CONTINUOUS VERTICAL GROUT SPACE.
14. CLEANOUT OPENINGS SHALL BE PROVIDED AT THE BOTTOM OF CELLS TO BE GROUT FILLED IN EACH POUR IN EXCESS OF 5 FEET IN HEIGHT. AFTER INSPECTION AND BEFORE GROUTING, THE REBAR SHALL BE TIED AT THE CLEANOUTS AND THE CLEANOUTS SHALL BE SEALED.
15. ANY OVERHANGING MORTAR OR OTHER OBSTRUCTION OR DEBRIS SHALL BE REMOVED FROM THE INSIDES OF SUCH CELL WALLS.
16. VERTICAL REINFORCEMENT SHALL BE HELD IN POSITION AT TOP AND BOTTOM AND AT INTERVALS NOT EXCEEDING 192 BAR DIAMETERS.
17. CELLS CONTAINING REINFORCEMENT SHALL BE FILLED SOLIDLY WITH GROUT. SAMPLE AND TEST GROUT PER ASTM C1019.
18. GROUT SHALL BE POURED IN LIFTS OF 4 FEET MAXIMUM HEIGHT. GROUT SHALL BE CONSOLIDATED AT TIME OF PLACING BY VIBRATING AND RECONSOLIDATED LATER BY VIBRATING BEFORE PLASTICITY IS LOST.
19. WHEN TOTAL GROUT POUR EXCEEDS 5'-4" FEET IN HEIGHT, (HIGH LIFT GROUTING), THE GROUT SHALL BE PLACED IN 4-FOOT LIFTS WITH A MINIMUM OF A 30 MINUTE DELAY BETWEEN LIFTS. MINIMUM CELL DIMENSION SHALL BE IN ACCORDANCE WITH TABLE 5 OF TMS 402 (3" X 3" FOR COARSE GROUT, 12 FT. MAXIMUM POUR HEIGHT).
20. WHEN THE GROUTING IS STOPPED FOR ONE HOUR OR LONGER, HORIZONTAL CONSTRUCTION JOINTS SHALL BE MADE BY STOPPING THE POUR OF GROUT NOT LESS THAN 1-1/2 INCH BELOW THE TOP OF THE UPPERMOST UNIT GROUTED.
21. WHERE CONCRETE BEAMS ARE INSTALLED IN CONCRETE MASONRY WALL, SUPPORT CONCRETE WITH 6" SIDE CONTINUOUS STRIPS OF 1/8 SQUARE MESH SOFFIT SCREENING OR PUR-O-STOP OF EQUAL CENTERED OVER BLOCK WORK. USE OF ROOFING FELT STRIPS WILL NOT BE PERMITTED.
22. MASONRY WALLS MARKED AS "LOAD BEARING" ARE DESIGNED TO CARRY FLOOR GRAVITY LOADS AND MUST BE CONSTRUCTED TO SUPPORT THE CONCRETE FLOOR SLAB CONCURRENTLY WITH CONCRETE COLUMN CONSTRUCTION.
23. MASONRY WALLS INDICATED AS "INFILL" ARE DESIGNED TO RESIST LATERAL LOADS AND MUST BE CONSTRUCTED AFTER THE CONCRETE SLAB IS CAST AND POST TENSIONING OPERATION IS COMPLETED. INFILL WALLS SHALL BE CONSTRUCTED STARTING AT THE FOUNDATION LEVEL AND WORKING UPWARD ONE LEVEL AT A TIME. DO NOT START NEXT HIGHER LEVEL OF WALL PRIOR TO COMPLETION OF WALL BELOW. ALLOW A MINIMUM OF 3 DAYS CURING FOR GROUT OF WALL BELOW PRIOR TO STARTING WALL ABOVE.
24. SINGLE STORY MASONRY WALLS INDICATED AS "PARTITION WALLS" SHALL BE CAST ON THICKENED SLAB FOUNDATIONS AND ARE NOT DESIGNED TO CARRY ANY LOADS FROM THE MAIN BUILDING STRUCTURES. ISOLATE TOP OF PARTITION WALLS FROM UNDERSIDE OF CONCRETE SLAB WITH A MINIMUM 1/2" THICK COMPRESSIBLE MATERIAL.
25. PROVIDE DOVETAIL ANCHORS AT 16" C/C, UNLESS NOTED OTHERWISE, WHERE MASONRY WALLS ABUT CONCRETE SURFACES.
26. SUBMIT WRITTEN CONSTRUCTION SEQUENCES AND PROCEDURES PRIOR TO THE START OF MASONRY CONSTRUCTION.
27. REINFORCING SHALL BE ASTM A615 GRADE 60 DEFORMED BARS, FREE FROM OIL, SCALE AND RUST AND PLACED IN ACCORDANCE WITH THE TYPICAL BENDING DIAGRAM AND PLACING DETAILS OF ACI STANDARDS AND SPECIFICATIONS.
28. SECURE APPROVAL OF REINFORCING SHOP DRAWINGS PRIOR TO COMMENCING FABRICATION.
29. PROVIDE STANDARD HOOKS AT ENDS OF ALL BARS WHICH TERMINATE IN TIE BEAMS OR BOND BEAMS.
30. WHERE REINFORCING IS SHOWN CONTINUOUS, LAP SPLICE BARS IN ACCORDANCE WITH SPLICE TABLE IN TYPICAL DETAIL.
31. PROVIDE DOWELS INTO FOOTINGS, PILE CAPS, SUPPORT BEAMS, ETC. TO MATCH VERTICAL BARS WITH LAP SPLICES PER SPLICE TABLE IN TYPICAL DETAIL, UNO.
32. MECHANICAL BAR COUPLERS MAY BE USED TO SPLICE CONTINUOUS BARS, IN LIEU OF LAP SPLICES. BAR COUPLERS MUST ACHIEVE 125% OF BAR STRENGTH MINIMUM. COUPLERS MAY BE BOLTED TYPE (DAYTON D-250 BAR-LOCK S-SERIES COUPLER OR EQUAL) OR THREADED TYPE (DAYTON D310 TAPER-LOCK COUPLER OR EQUAL). COUPLERS SHALL BE INSTALLED PER MANUFACTURER'S WRITTEN INSTALLATION RECOMMENDATIONS.
33. AT CHANGES IN DIRECTION OF BOND BEAMS, PROVIDE CORNER BARS OF SAME SIZE AND SPACING AS HORIZONTAL STEEL.

4814 TIE BEAMS:

1. BEAMS WITH THE PREFIX "TB" SHALL BE OF CONCRETE, POURED AFTER THE MASONRY WALLS BELOW ARE IN PLACE.
2. REINFORCING SHALL BE CONTINUOUS THROUGH TIE BEAMS WITH MINIMUM LAP SPLICES OF 48 BAR DIAMETERS AND BENT BARS AT CORNERS.
3. USE METAL LATH, MORTAR, OR SPECIAL UNITS TO CONFINE CONCRETE TO AREA REQUIRED, IN ACCORDANCE WITH TMS 602 (SOLID METAL OR FELT CAVITY CAPS ARE PROHIBITED).
4. AT TIE BEAMS DIRECTLY OVER OPENINGS, REDUCE SPACING OF STIRRUPS OVER THE OPENING TO EITHER HALF OF TYPICAL SPACING, OR D/2, WHICHEVER IS LESS. THIS REQUIREMENT SHALL ALSO APPLY WHERE HEIGHT OF MASONRY BETWEEN BOTTOM OF TIE BEAM AND TOP OF OPENING IS LESS THAN THE WIDTH OF THE OPENING DIVIDED BY TWO.
5. WHERE TIE BEAMS CANTILEVER OUT FROM SUPPORTING WALL, TOP AND BOTTOM BARS SHALL BE FULLY DEVELOPED INTO TIE BEAM BEYOND SUPPORT, EITHER BY PROVIDING FULL CLASS B LAP SPLICE OR STANDARD ACI HOOKS EMBEDDED DEEP ENOUGH BEYOND SUPPORT TO DEVELOP STRENGTH OF BAR. ALSO, REDUCE STIRRUP SPACING PER NOTE ABOVE.

4816 LINTELS:

1. MASONRY OPENINGS LESS THAN ** FEET SHALL BE SPANNED WITH 8"x16" CONCRETE LINTELS WITH 2#5 REINFORCING BARS TOP AND BOTTOM.
2. MASONRY OPENINGS LESS THAN ** FEET SHALL BE SPANNED WITH 8"x12" CONCRETE LINTELS WITH 2#5 REINFORCING BARS TOP AND BOTTOM.
3. MASONRY OPENINGS LESS THAN *** FEET SHALL BE SPANNED WITH 8"x8" CONCRETE LINTELS WITH 2#5 REINFORCING BARS BOTTOM.
4. LINTELS SHALL BEAR A MINIMUM OF 8" AT EACH END.

4860 BRICK/STONE VENEER:

1. SEE ARCHITECTURAL DRAWINGS FOR BRICK VENEER SPECIFICATIONS.
2. ALL BRICK SUPPORT ANGLES SHALL BE GALVANIZED AND SHALL BE LOCATED AT EACH SLAB LEVEL. BRICK ANGLES ARE TO ATTACHED WITH HEADED STUDS AS SHOWN IN DETAILS.
3. ATTACH BRICK VENEER TO WALL WITH GALVANIZED TIES.

5120 STRUCTURAL STEEL:

1. STEEL WORK SHALL BE NEW AND CONFORM TO THE ANSI/AISC 360-10 SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS.
2. MATERIAL SHALL CONFORM TO THE FOLLOWING, EXCEPT AS NOTED:

WIDE FLANGE SHAPES	ASTM A992 (Fy=50 KSI)
RECTANGULAR HSS	ASTM A500, GRADE B (Fy=46 KSI)
HIGH STRENGTH BOLTS	ASTM A325 OR A490
ANCHOR RODS	ASTM F1554 GR. 36 (Fy=36 KSI)
SHEAR STUD CONNECTORS	ASTM A108 (Fu=65 KSI)

3. CONNECTIONS:
   A. BOLTS SHALL BE HIGH-STRENGTH, BEARING TYPE IN SNUG TIGHT CONDITION, U.N.O. TIGHTEN BY AN AISC APPROVED METHOD.
   B. WELDING ELECTRODES SHALL BE PER AWS D1.1. RETURN FILLET WELDS FOR FRAMED CONNECTIONS 1/2" AT EACH END.
   C. FIELD CONNECTIONS SHALL BE BOLTED, EXCEPT AS NOTED OTHERWISE.
   D. DESIGN BEAM CONNECTIONS TO DEVELOP THE REACTIONS SHOWN. IF NOT SHOWN, DESIGN CONNECTIONS TO DEVELOP THE REACTIONS DUE TO THE MAXIMUM ALLOWABLE UNIFORM LOAD FOR THE BEAM SIZE AND SPAN SHOWN, ASSUMING FULL LATERAL SUPPORT PER AISC BEAM (ALLOWABLE UNIFORM LOAD) TABLE VALUE FOR THE CORRESPONDING SPAN, U.N.O.
   E. DESIGN DIAGONAL BRACING CONNECTIONS TO DEVELOP THE REACTIONS SHOWN. IF REACTIONS ARE NOT SHOWN, DESIGN CONNECTIONS TO DEVELOP FULL TENSION CAPACITY OF THE DIAGONAL BRACING MEMBER.
   F. CALCULATIONS AND SHOP DRAWINGS FOR STRUCTURAL STEEL CONNECTIONS SHALL BE SUBMITTED FOR APPROVAL PRIOR TO FABRICATION AND SHALL BE SIGNED AND SEALED BY AN ENGINEER REGISTERED IN THE STATE OF FLORIDA (IN WHICH THE PROJECT RESIDES).
4. HIGH STRENGTH BOLTS IN BEARING CONDITION SUPPORTING SIMPLE SPAN BEAMS NOT SUBJECT TO AXIAL LOADS MAY BE INSTALLED TO "SNUG TIGHT" CONDITION IF NORMAL, OR SHORT SLOTTED HOLES ARE USED. THE ENGINEER OF RECORD WILL BE THE ULTIMATE AUTHORITY IN THE USE OF "SNUG TIGHT" BOLTS. IF LONG SLOTTED OR OVERSIZED HOLES ARE USED, BOLTS MUST BE FULLY PRETENSIONED AND SLIP CRITICAL. PROPER SURFACE PREPARATION IS REQUIRED FOR SLIP CRITICAL BOLTS, INCLUDING OMISSION OF PRIMER OR FIRE PROOFING, AS APPROPRIATE.
5. BOLTS SHARING LOAD WITH WELDS IN A CONNECTION SHALL BE FULLY PRETENSIONED AND SLIP CRITICAL.
6. WHERE FULLY PRETENSIONED OR SLIP CRITICAL BOLTS ARE REQUIRED, TIGHTENING SHALL BE ACHIEVED USING EITHER TWIST-OFF TENSION CONTROL BOLTS OR DIRECT TENSION INDICATING WASHERS.
7. ALL STRUCTURAL STEEL EXPOSED TO EXTERIOR CONDITIONS SHALL BE HOT DIPPED GALVANIZED PER ASTM A123 AND ALL FASTENERS AND HARDWARE SHALL BE HOT DIPPED GALVANIZED PER ASTM A153. WHERE GALVANIZING SURFACE IS DAMAGED, INCLUDING AT LOCATIONS OF FIELD WELDING, MEMBERS SHALL BE TOUCHED UP WITH ZINC RICH PRIMER.
8. GROUT UNDER BEARING PLATES SHALL BE NON-METALLIC, NON-SHRINK TYPE WITH A COMPRESSIVE STRENGTH OF AT LEAST 5,000 PSI IN 28 DAYS.
9. IT IS THE INTENTION OF THESE DESIGN DOCUMENTS TO DELEGATE THE DESIGN OF ALL STRUCTURAL STEEL CONNECTIONS TO A QUALIFIED SPECIALTY PROFESSIONAL ENGINEER, REGISTERED IN THE STATE OF FLORIDA. THIS REQUIREMENT EXTENDS TO ALL CONNECTIONS, WITH THE EXCEPTION OF THOSE SPECIFICALLY FULLY DESIGNED IN THE DESIGN DOCUMENTS. IT IS ANTICIPATED THAT PROSPECTIVE STRUCTURAL STEEL FABRICATORS WILL PERFORM NECESSARY INVESTIGATION TO DETERMINE THE FULL IMPACT OF CONNECTION CLEARANCE REQUIREMENTS, AS WELL AS THE POTENTIAL NECESSARY INTRODUCTION OF DOUBLER PLATES, CONTINUITY PLATES, AND/OR WEB FLANGE OR OTHER STIFFENERS PRIOR TO SUBMITTING ANY BID FOR THIS WORK.
10. PROVIDE SIGNED AND SEALED CALCULATIONS FOR ALL STRUCTURAL STEEL CONNECTION DESIGN PREPARED BY A PROFESSIONAL ENGINEER REGISTERED IN THE STATE OF FLORIDA (IN WHICH THE PROJECT RESIDES). CALCULATIONS ARE TO BE SUBMITTED SIMULTANEOUSLY WITH CORRESPONDING SUBMITTAL.
11. APPLY FIREPROOFING TO STEEL STRUCTURE CALCULATING THE THICKNESS OF FIREPROOFING BY COMPARING THE ACTUAL MEMBER SIZE TO THE MEMBER SIZE USED IN THE DESIGNATED UL RATING AND ADJUSTING APPROPRIATELY.
12. USE INTUMESCENT PAINT ON STRUCTURAL STEEL EXPOSED TO VIEW WHICH REQUIRES FIRE RATING. SEE ARCHITECTURAL DRAWINGS FOR FIRE RATING AND INTUMESCENT PAINT REQUIREMENTS.
13. STEEL EXPOSED TO VIEW: DRESS ALL WELDS, REMOVE BURS, AND FILL ROLLED TRADE NAMES WITH WELD METAL AND GRIND SMOOTH. TYPICAL AT ALL ARCHITECTURALLY EXPOSED CONDITIONS.

5122 WELDING:

1. WELDING SHALL BE DONE BY WELDERS WITH CURRENT CERTIFICATION IN ACCORDANCE WITH AWS D1.1.
2. WELDS SHOWN ON STRUCTURAL DRAWINGS ARE MINIMUM DESIGN REQUIREMENTS. THE FABRICATOR'S SHOP DRAWINGS SHALL REFLECT WELDS IN ACCORDANCE WITH AWS REQUIREMENTS.
3. FULL PENETRATION GROOVE WELDS SHALL BE INSPECTED BY ULTRASONIC TESTING. TWENTY-FIVE PERCENT OF THE WELDS SHALL BE INSPECTED AT RANDOM UNLESS NOTED OTHERWISE. SEE SPECIFICATIONS FOR ADDITIONAL REQUIREMENTS.
4. UNLESS NOTED OTHERWISE ON THE DRAWINGS, GROOVE WELDS SHALL BE FULL PENETRATION.
5. PROVIDE FILLET WELDS AT CONTACT POINTS BETWEEN STEEL MEMBERS SUFFICIENT TO DEVELOP THE ALLOWABLE TENSILE STRENGTH OF THE SMALLER MEMBER AT THE JOINT UNLESS DETAILED OTHERWISE ON THE DRAWINGS. THE MINIMUM FILLET WELD SIZE IS 3/16" UNLESS OTHERWISE NOTED.
6. MINIMUM TENSILE STRENGTH OF ELECTRODE MATERIAL F_{EXX} = 70ksi UNLESS NOTED OTHERWISE.

THIS BUILDING IS CLASSIFIED AS A "THRESHOLD BUILDING" SPECIAL INSPECTION OF THE CONSTRUCTION IS REQUIRED BY THE STATE OF FLORIDA IN ACCORDANCE WITH CHAPTER 553 OF THE FLORIDA STATUTES. CONSTRUCTION SHALL BE INSPECTED IN ACCORDANCE WITH THE SPECIAL INSPECTION PLAN.

OKALOOSA COUNTY

FLY VPS

CI 9-2811-AP
Construction of Satellite Concourse 'C'

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SEAL

Revisions

No.	Date	Description

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THINK. LISTEN. CREATE.

Key Plan

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Issue Date:	30-NOV-2020
Drawing Scale:	

Drawing Title:

STRUCTURAL GENERAL NOTES

BID DOCUMENTS

Drawing No.:

S002

5210 STEEL JOISTS:

1. SHALL BE THE SIZE AND SPACING AS SHOWN ON THE STRUCTURAL DRAWINGS AND SHALL BE DESIGNED, FABRICATED, INSTALLED AND BRIDGED IN ACCORDANCE WITH THE STEEL JOIST INSTITUTE SPECIFICATIONS, LATEST EDITION. JOIST SIZES SHOWN ON PLANS ARE MINIMUM SIZES BASED ON SJI STANDARD UNIFORM GRAVITY LOAD TABLES. THE JOIST MANUFACTURER MAY INCREASE THE SIZE OF THE JOISTS, WITHIN THE SAME DEPTH CLASS, AS REQUIRED TO ACCOUNT FOR UPLIFT LOADS OR OTHER NON-STANDARD LOADS.
2. ENDS OF BRIDGING LINES TERMINATING AT WALLS OR BEAMS SHALL BE ANCHORED THERETO AT TOP AND BOTTOM CHORDS. MINIMUM JOIST BRIDGING TERMINATION CONNECTIONS TO MASONRY SHALL BE L3x3x1/4x3" LONG WITH (1) 1/2" DIAMETER ANCHOR BOLT OR L4x4x1/4x0'-3" WITH (1) 1/2"x5" ANCHOR BOLT TO CONCRETE.
3. BRIDGING SHALL BE WELDED OR BOLTED AT POINTS OF CONTACT. WELD SHALL NOT DAMAGE THE JOIST. CROSS BRIDGING SHALL BE WELDED OR BOLTED AT ITS CENTER POINT. BRIDGING SHALL BE STRAIGHT FROM JOIST TO JOIST. CHANGES IN SLOPE OR DIRECTION SHALL BE MADE AT A JOIST, NOT BETWEEN JOISTS.
4. K-SERIES JOISTS SHALL BEAR A MINIMUM OF 2½" ON STEEL BEAMS AND 4" ON CONCRETE BEAMS. ***ENGINEER TO DELETE IF DETAIL PROVIDED*** JOIST BEARING PLATES TO BE MINIMUM 3/8"x4"x7½" WITH (2) 1/2" DIAMETER x 5" SHEAR STUD CONNECTORS. BEARING PLATES FOR BACK TO BACK SINGLE JOISTS SHALL BE MINIMUM 3/8"x7½"x7½" WITH (4) 1/2" DIAMETER x 5" SHEAR STUD CONNECTORS. BEARING PLATES SHALL BE CAST INTEGRALLY WITH THE CONCRETE BEAM. WELD JOISTS TO BEARING PLATES WITH A MINIMUM OF (2) 1/8" FILLET WELDS, UNLESS NOTED OTHERWISE.
5. HANGERS FOR SUPPORT OF EQUIPMENT, OR MEMBERS SUPPORTING SUCH HANGERS, SHALL BE LOCATED AT PANEL POINTS OF JOISTS, AND SHALL BE HUNG FROM THE TOP CHORD OF THE JOIST.
6. ROOF JOISTS SHALL BE DESIGNED FOR NET UPLIFT PRESSURES AS SHOWN ON DRAWINGS.
7. SUBMIT SHOP DRAWINGS FOR REVIEW PRIOR TO FABRICATION. SHOP DRAWING SUBMITTAL SHALL INCLUDE LAYOUT, COMPONENT DESIGNATION, BRIDGING, AND PERTINENT SECTIONS AND DETAILS.
8. SUBMITTALS FOR JOISTS, OTHER THAN STANDARD SJI CATALOG SELECTIONS WHICH HAVE BEEN VERIFIED BY SJI, SHALL BE SIGNED AND SEALED BY AN ENGINEER REGISTERED IN THE STATE OF FLORIDA.
9. JOISTS SHALL BE DESIGNED TO SUPPORT THE LOADS LISTED IN SECTION 1060, THOSE INDICATED ON PLANS, AND AN ADDITIONAL CONCENTRATED DEAD LOAD NOT TO EXCEED 500# TO BE PLACED AT ANY PANEL ALONG THE LENGTH OF THE JOIST. DEAD LOADS SHALL BE IN ACCORDANCE WITH THE MATERIALS SHOWN WITHIN THE CONTRACT DOCUMENTS AND SHALL BE NOTED ON THE SHOP DRAWING SUBMITTAL BY THE JOIST MANUFACTURER.
10. JOIST BOTTOM CHORDS SHALL BE DOUBLE ANGLES.
11. JOISTS ARE TO BE DESIGNED TO ALLOW 1" MAXIMUM DIFFERENCE IN CAMBER BETWEEN ADJACENT PARALLEL JOISTS.
12. JOIST MANUFACTURER SHALL COORDINATE WITH MECHANICAL AND ELECTRICAL DRAWINGS FOR ADDITIONAL LOADS DUE TO EQUIPMENT TO BE SUPPORTED BY ROOF STRUCTURE. ALL ADDITIONAL LOADS SHALL BE CLEARLY INDICATED ON SHOP DRAWINGS SUBMITTALS.
13. WHERE ROOF JOISTS ARE USED TO BRACE STEEL ROOF BEAMS (AS SHOWN ON PLANS AND DETAILS), DESIGN JOISTS TO RESIST A 500 LB AXIAL BRACE LOAD AT EACH BRACE. THIS LOAD SHALL ACT CONCURRENTLY WITH ALL WIND LOAD CASES AND COMBINATIONS.

5212 JOIST BEARING:

1. WHERE STEEL BEAMS SUPPORT JOISTS FRAMING FROM ONE SIDE ONLY, OR WHERE JOISTS FROM ONE SIDE ARE 30% LONGER THAN THE JOISTS ON THE OPPOSITE OF THE BEAM, JOISTS SHALL BEAR FULL WIDTH OF THE STEEL BEAM OR 5-1/2", WHICH EVER IS LESS.
2. CONTRACTOR SHALL COORDINATE JOIST SEAT HEIGHTS AND TOP OF STRUCTURAL STEEL SUPPORTS TO ENSURE PROPER DECK ELEVATIONS.

5312 STEEL ROOF DECK:

1. SHALL BE GALVANIZED (G60), TYPE "B" STEEL ROOF DECK OF GAGE AND DEPTH INDICATED ON DRAWINGS, AND SHALL CONFORM TO THE PROVISIONS OF THE STEEL DECK INSTITUTE (SDI) SPECIFICATIONS FOR STEEL ROOF DECK.
2. DECK SHALL BE VENTED IN AREAS TO RECEIVE LIGHT WEIGHT INSULATING CONCRETE FILL, PER FBC SECTION 1917.4.1; COORDINATE VENTING AREA REQUIREMENT W/ INSULATING FILL MANUFACTURER.
3. DECK CENTERING SHALL BE PLACED IN CONFORMANCE WITH MANUFACTURER'S RECOMMENDATIONS AND SHALL BE CONTINUOUS OVER AT LEAST 3 SPANS.
4. WELD PATTERN AT MAIN DECK SUPPORTS, AND SIDELAP CONNECTIONS, SHALL BE AS INDICATED ON ROOF DECK FASTENING DIAGRAM. PROVIDE 5/8" PUDDLE WELDS AT 12" O.C. ALONG EDGE SUPPORTS, UNLESS NOTED OTHERWISE.
5. DECK SHALL BE TOPPED WITH TYPE II INSULATING FILL CONSISTING OF RIGID INSULATING BOARD COVERED WITH TWO OR MORE INCHES OF LIGHT WEIGHT INSULATING CONCRETE OVER THE TOP (MAX. 30 P.C.F. OVEN DRY DENSITY).
6. METAL DECK MANUFACTURER SHALL BE A MEMBER OF THE STEEL DECK INSTITUTE AND ALL DESIGN SHALL BE IN ACCORDANCE WITH APPLICABLE STANDARDS.
7. DO NOT HANG MEP SYSTEMS (DUCTWORK, ROOF DRAIN OR FIRE PROTECTION PIPING, ETC) FROM ROOF DECK. ALL EQUIPMENT IS TO BE HUNG FROM ROOF JOISTS. SEE SECTION 5210 FOR ROOF JOIST REQUIREMENTS.

THRESHOLD INSPECTION PLAN

GENERAL

1. PER FLORIDA STATUTE §553.79, THE FOLLOWING PLAN PROVIDES SPECIFIC PROCEDURES AND SCHEDULES SO THE BUILDING CAN BE INSPECTED FOR COMPLIANCE WITH THE PERMITTED DOCUMENTS. THIS PLAN SHALL BE AVAILABLE AT THE JOBSITE FOR USE BY THE BUILDING OFFICIAL, SPECIAL INSPECTOR OR THE DESIGNATED REPRESENTATIVE. NOTWITHSTANDING THE PRECEDING, DURING THE COURSE OF CONSTRUCTION THE SPECIAL INSPECTOR MAY OBSERVE ITEMS NOT SPECIFICALLY LISTED BELOW WHICH HE DETERMINES NEED TO BE INSPECTED. FLORIDA STATUTE §553.79 LISTS A NUMBER OF RESPONSIBILITIES THAT ARE IN NO WAY EXEMPTED BY THE FOLLOWING.
2. THIS PLAN SHALL NOT RELIEVE THE GENERAL CONTRACTOR OR HIS SUBCONTRACTORS OF ANY LIABILITY, RESPONSIBILITY OR CONTRACTUAL OBLIGATIONS RELATED TO THE CONSTRUCTION AND INSTALLATION OF THE STRUCTURAL COMPONENTS OF THE BUILDING, NOR DOES IT RELIEVE THE CONTRACTOR OF HIS RESPONSIBILITIES TO CARRY OUT HIS OWN QUALITY CONTROL INSPECTIONS AND TESTING. THIS PLAN INTENDS THAT ALL STRUCTURAL LOAD BEARING ELEMENTS **INCLUDING WIND LOADED ELEMENTS** BE INSPECTED FOR COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS.
3. THE CONTRACTOR SHALL COOPERATE WITH AND ASSIST THE SPECIAL INSPECTOR IN PERFORMING HIS INSPECTION DUTIES AS SPECIFIED BELOW. THE SPECIAL INSPECTOR SHALL HAVE FREE ACCESS TO THE PROJECT AT ALL TIMES. THE CONTRACTOR SHALL REVIEW THIS PLAN, COORDINATE AND SCHEDULE WORK TO ACCOMMODATE THE REQUIRED INSPECTIONS. THE CONTRACTOR SHALL PROVIDE A MINIMUM OF TWENTY-FOUR (24) HOUR NOTICE TO THE SPECIAL INSPECTOR FOR ALL INSPECTIONS.
4. PER SECTION §553.79 5(A), THE PROFESSIONAL ENGINEER RESPONSIBLE FOR THE DESIGN OF THE SHORING AND RE-SHORING SHALL INSPECT IT FOR CONFORMANCE WITH THE PLANS SUBMITTED TO THE ENFORCING AGENCY AND FURNISH A SIGNED AND SEALED LETTER TO THE SPECIAL INSPECTOR STATING THE INSTALLATION IS IN CONFORMANCE WITH THE SUBMITTED PLANS, PRIOR TO CONCRETE PLACEMENT.
5. PER SECTION §553.79 7(C), EACH SHORING AND RE-SHORING INSTALLATION SHALL BE SUPERVISED, INSPECTED AND CERTIFIED BY THE CONTRACTOR TO BE IN COMPLIANCE WITH THE SHORING DOCUMENTS.

PROCEDURES AND SCHEDULE

1. THE THRESHOLD INSPECTOR SHALL PERFORM SITE VISITS AT A FREQUENCY DETERMINED BY HIM TO SATISFY HIM THAT THE INSPECTIONS ARE BEING PERFORMED BY HIS ON-SITE REPRESENTATIVE(S) IN ACCORDANCE WITH THIS PLAN.
2. THE CONTRACTOR SHALL ADVISE THE SPECIAL INSPECTOR IN ADVANCE OF CONSTRUCTION SCHEDULES AND PLANNED OPERATIONS IN ORDER TO ASSURE TIMELY AND APPROPRIATE OBSERVATION INSPECTION.
3. THE SPECIAL INSPECTOR SHALL COOPERATE WITH THE CONTRACTOR AND SHALL REFRAIN FROM DIRECTING WORK, AS THIS IS EXPRESSLY NOT PART OF THE SPECIAL INSPECTION.

SOIL COMPACTION & FOUNDATIONS

1. CONFIRM THAT A SOILS TESTING LABORATORY MONITORS SOIL COMPACTION, AND PERFORMS TESTS TO VERIFY THAT THE INSTALLATIONS MEET THE REQUIREMENTS STATED IN THE PROJECT'S SPECIFICATIONS AND THE SOILS REPORT SUBMITTED BY PROFESSIONAL SERVICE INDUSTRIES. INC.
2. VERIFY THAT FOOTINGS AND FOUNDATIONS ARE IN CONFORMANCE WITH THE CONSTRUCTION DOCUMENTS. SPECIFICALLY VERIFY SIZE, REINFORCING, CONFIGURATION, LAP SPLICES, LOCATION, ADDITIONAL BARS AT CORNERS AND INTERSECTIONS, COVER ON REINFORCING AND ORIENTATION.
3. MONITOR CONSTRUCTION TO ENSURE THAT THERE HAS BEEN NO UNDERMINING OR EXCAVATION UNDER EXISTING FOOTINGS FOR ANY REASON, E.G. TO INSTALL UNDERGROUND UTILITIES AND PIPING, ETC.
4. VERIFY THAT DE-WATERING METHODS ARE MAINTAINED AS RECOMMENDED BY THE GEOTECHNICAL REPORT AND THAT PROCEDURES DO NOT ADVERSELY AFFECT THE STRUCTURAL INTEGRITY OF THE FOUNDATIONS.

CONCRETE AND REINFORCEMENT

1. CONFIRM THAT THE CONTRACTOR HAS OBTAINED APPROVED SHOP DRAWINGS FOR SPECIFIED ITEMS PRIOR TO COMMENCING WORK. THIS INCLUDES, BUT IS NOT LIMITED TO, ANCHOR BOLTS, EMBEDDED ITEMS, STEEL REINFORCING, FORMWORK, SHORING AND CONCRETE MIX DESIGNS.
2. VERIFY THAT REINFORCING STEEL IS INSTALLED PER THE CONSTRUCTION DOCUMENTS AND APPROVED SHOP DRAWINGS. SPECIFICALLY VERIFY SIZE, GRADE, LAP SPLICE LENGTH AND LOCATION, QUANTITY AND/OR SPACING, BENDS OR OFFSETS AND COVERAGE. REPORT ANY DEVIATIONS TO THE GENERAL CONTRACTOR FROM THE CONTRACT DOCUMENTS BEFORE CONCRETE IS CAST AND CONFIRM CORRECTIONS ARE MADE.
3. VERIFY THAT DOWELS, ANCHOR BOLTS AND EMBEDDED ITEMS ARE PROPERLY INSTALLED AND SECURED IN PLACE PRIOR TO CONCRETE PLACEMENT.
4. VERIFY THAT REINFORCING IS NEW BILLET STEEL AND IS CLEAN OF ALL LOOSE, FLAKING RUST OR SCALE AND IS FREE OF GREASE OR OTHER FOREIGN MATERIALS WHICH COULD REDUCE OR PREVENT BOND.
5. VERIFY THAT DEBRIS AND FOREIGN MATERIAL HAS BEEN REMOVED FROM FORMS BEFORE CONCRETE IS PLACED.
6. COLUMNS: INSPECT REINFORCING STEEL, DOVETAIL SLOTS AND OTHER EMBEDDED ITEMS. CHECK TIE SPACING, ESPECIALLY DOUBLE TIES AND TIES AT DEEP BEAM INTERSECTIONS.
7. BEAMS: INSPECT REINFORCING STEEL. CHECK TIE SPACING, INCLUDING LOCATION OF FIRST TIE. CHECK FOR HOOKED BARS. CHECK THAT HOOKED BARS EXTEND TO FAR FACE OF SUPPORT. VERIFY REINFORCING IS PLACED IN ACCORDANCE WITH DIAGRAMS AND DETAILS ON PROJECT DRAWINGS, INCLUDING ADDITIONAL REINFORCING REQUIRED AT CORNERS AND INTERSECTIONS.
8. ONE WAY SLABS: INSPECT REINFORCING STEEL, INCLUDING TEMPERATURE STEEL. CHECK THAT HOOKED BARS EXTEND TO FAR FACE OF SUPPORT.
9. TWO WAY SLABS: INSPECT REINFORCING STEEL. CHECK FOR PROPER LAYERING. CHECK PLACEMENT OF TOP BARS THROUGH COLUMN STRIP FOR UNIFORM SPACING (BARS ARE NOT TO BE TIED TOGETHER). CHECK THAT ADDED TOP BARS ARE PLACED WITHIN THE VICINITY OF THE COLUMN. CHECK THAT ADDED BOTTOM BARS EXTEND TO FACE OF COLUMN, UNLESS OTHERWISE SHOWN ON CONTRACT DOCUMENTS, AND THAT THEY ARE WITHIN THE COLUMN STRIP. CHECK HOOK BAR REQUIREMENTS, BOTH TOP AND BOTTOM. CHECK THAT HOOKS ARE PLACED AT FAR FACE OF SUPPORT. CHECK POSITION OF BARS AT SLAB OFFSETS AND DEPRESSIONS.
10. CHECK THAT EXPANSION JOINT MATERIAL, ANCHORS AND OTHER EMBEDDED ITEMS ARE CORRECT AND HAVE BEEN POSITIONED AND SECURED IN PLACE SO THAT DISPLACEMENT IS NOT POSSIBLE.
    a. CHECK THAT CONDUITS PLACED IN THE SLAB ARE REASONABLY SPACED TO ENSURE INTEGRITY OF THE SLAB AND DO NOT VIOLATE REQUIREMENTS INDICATED IN THE CONTRACT DOCUMENTS.
    b. CONFIRM THAT LOAD CARRYING EMBEDDED ITEMS ARE PLACED IN COMPLIANCE WITH THE CONTRACT DOCUMENTS. RELOCATION OF EMBEDDED ITEMS IN CONFLICT WITH REINFORCING WILL NOT BE PERMITTED WITHOUT PRIOR APPROVAL OF THE ARCHITECT/ENGINEER.
11. OPENINGS: REPORT ALL SLAB OPENINGS LARGER THAN 12" AND NOT SHOWN ON THE CONTRACT DOCUMENTS TO THE ARCHITECT/ENGINEER. CHECK PLACEMENT OF ADDITIONAL REINFORCEMENT AROUND OPENINGS. NO SLEEVES OR OPENINGS WILL BE PERMITTED IN BEAMS WITHOUT PRIOR APPROVAL OF THE ARCHITECT/ENGINEER.
12. AS REQUIRED BY THE CONSTRUCTION DOCUMENTS, VERIFY THAT A TESTING LABORATORY IS PRESENT AT THE JOBSITE TO TAKE SLUMP TESTS AND CYLINDERS BEFORE CONCRETE IS PLACED IN FORMS.
13. CONFIRM THAT THE CONCRETE BEING PLACED AT THE JOBSITE MEETS THE PROJECT REQUIREMENTS REGARDING MIXING AND DELIVERY TIME, SLUMP, CONCRETE STRENGTH AND THAT THE PROPER MIX DESIGN IS USED.
14. VERIFY THAT THE CONTRACTOR DOES NOT ADD WATER TO THE CONCRETE AFTER SLUMP TESTS AND CYLINDERS HAVE BEEN MADE. IF ADDITIONAL WATER IS ADDED TO INCREASE SLUMP, ANOTHER SLUMP TEST IS TO BE TAKEN. IF THE SLUMP TEST DOES NOT MEET THE PROJECT'S REQUIREMENTS, THE CONCRETE IS SUBJECT TO REJECTION.
15. REVIEW THE GENERAL ARRANGEMENT OF FORMS FOR COMPLIANCE WITH FORMWORK SHOP DRAWINGS. CHECK THAT THE FORMWORK INSTALLATION, REMOVAL AND RE-SHORING PROCEDURES ARE ACCORDING TO THE CONSTRUCTION DOCUMENTS AND SUBMITTED SHOP DRAWINGS. INSPECT THE SHORING AND RE-SHORING FOR CONFORMANCE WITH THE SHORING AND RE-SHORING PLANS SUBMITTED TO THE ENFORCING AGENCY.
16. REVIEW THE TIME SEQUENCE OF FORM REMOVAL AND RE-SHORING PROCEDURES AND SCHEDULE FOR COMPLIANCE WITH FORMWORK, SHORING AND RE-SHORING DRAWINGS AND PROJECT SPECIFICATIONS.
17. FOOTING EDGES ARE TO BE FORMED UNLESS UNFORMED FOOTINGS ARE PERMITTED PER THE CONSTRUCTION DOCUMENTS. IF UNFORMED FOOTING EDGES CANNOT RETAIN SHAPE DURING PLACEMENT OF CONCRETE, THEN FOOTING EDGES SHALL BE FORMED. VERIFY THAT SLOUGHED SOIL HAS BEEN CLEANED OUT AND REMOVED FROM EXISTING FOOTING.
18. OBSERVE THE PLACEMENT OF AT LEAST 50% OF CONCRETE BEING PLACED FOR STRUCTURAL ELEMENTS TO ASSURE THAT HANDLING, PLACING, CONSOLIDATION, FINISHING AND CURING IS IN ACCORDANCE WITH THE PROJECT'S SPECIFICATIONS.

OBSERVATION OF PLACEMENT OF CONCRETE FOR SLABS ON GRADE, WHICH DO NOT SUPPORT BEARING WALLS, IS NOT REQUIRED BUT REINFORCEMENT MUST BE INSPECTED

MASONRY

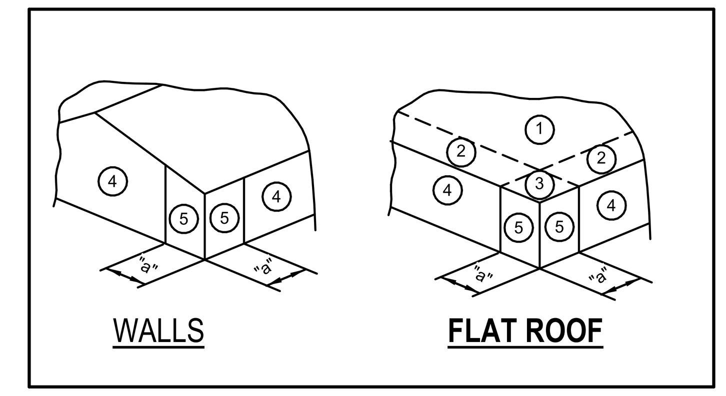
1. VERIFY THAT REQUIRED MASONRY SUBMITTALS, STRUCTURAL IN NATURE, HAVE BEEN ACCEPTED BY THE STRUCTURAL ENGINEER AND THAT COPIES ARE ON SITE.
2. VERIFY THAT MASONRY COMPONENTS USED ON THE JOB MATCH THE SUBMITTED ITEMS.
3. VERIFY THAT MASONRY IS PROPERLY INSTALLED. SPECIFICALLY CHECK FOR HORIZONTAL JOINT REINFORCING AND SIZE AND LOCATION OF FILLED CELL REINFORCING AND DOWELS.
4. VERIFY THAT FULL MORTAR BEDDING IS PLACED AROUND GROUT/CONCRETE FILLED CELLS.
5. VERIFY THAT INSPECTION/CLEAN-OUT HOLES ARE INSTALLED FOR **HIGHLIFT/LOWLIFT** GROUTING. ALSO, VERIFY THAT DEBRIS AND LOOSE MORTAR HAS BEEN REMOVED PRIOR TO CLOSING HOLE.
6. INSPECT AT LEAST 50% OF CONCRETE GROUT PLACEMENT FOR GROUTED MASONRY.

STRUCTURAL STEEL AND STEEL CONNECTIONS

1. CONFIRM THAT PLACEMENT OF STRUCTURAL STEEL, STEEL JOISTS AND METAL DECK IS IN ACCORDANCE WITH THE CONSTRUCTION DOCUMENTS AND APPROVED SHOP DRAWINGS.
2. CONFIRM THAT A TESTING LABORATORY INSPECTS BOLTED AND WELDED CONNECTIONS AND DECK WELDING PER THE REQUIREMENTS OF THE PROJECT DOCUMENTS.
3. VERIFY THAT THE ATTACHMENT OF THE METAL DECK IS PER THE PROJECT'S SPECIFICATIONS.
4. VERIFY THAT BRACING CALLED FOR IN THE CONSTRUCTION DOCUMENTS IS INSTALLED TO SUPPORT ELEMENTS DURING CONSTRUCTION.
5. CONFIRM THAT CONNECTIONS MADE TO EXISTING FRAMING EMBEDS OR MEMBERS ARE MADE PER STRUCTURAL DETAILS.

REPORTING

1. DURING AN INSPECTION, IF A DEFICIENCY IS OBSERVED AND HAS NOT BEEN CORRECTED PRIOR TO LEAVING THE SITE, THE SPECIAL INSPECTOR SHALL INFORM THE CONTRACTOR OF THE DEFICIENCY. IF THE DEFICIENCY IS DISPUTED BY THE CONTRACTOR, IMMEDIATELY INFORM THE STRUCTURAL ENGINEER AS TO THE NATURE OF THE DEFICIENCY AND ITS EXTENT.
2. ADDITIONALLY, FOR THE ITEMS FOUND IN NON-CONFORMANCE WITH THE CONSTRUCTION DOCUMENTS AND NOT CORRECTED DURING THE INSPECTION, THE SPECIAL INSPECTOR SHALL MAINTAIN A LOG OF THE DEFICIENT ITEMS AT THE SITE. THE DEFICIENCIES SHALL BE CONSECUTIVELY NUMBERED AND INCLUDE DATE ITEM OBSERVED AND DATE ITEM CORRECTED. THE LOG SHALL BE SUBMITTED MONTHLY FOR REVIEW BY CONTRACTOR, ENGINEER OF RECORD AND BUILDING OFFICIAL.
3. IT IS NOT THE RESPONSIBILITY OF THE SPECIAL INSPECTOR TO SEEK A SOLUTION TO DEFICIENCIES AND UNDER NO CIRCUMSTANCES IS HE TO REDESIGN A DEFICIENT CONDITION OR ALLOW A DEVIATION WITHOUT PRIOR APPROVAL FROM THE STRUCTURAL ENGINEER. THE CONTRACTOR ALONE IS RESPONSIBLE FOR CONTACTING THE STRUCTURAL ENGINEER FOR SOLUTIONS TO DEVIATIONS AND NON-CONFORMING ITEMS.
4. THE SPECIAL INSPECTOR SHALL SUBMIT AN ORIGINAL SIGNED AND SEALED COPY OF WRITTEN REPORTS FOR EACH INSPECTION TO THE ENGINEER OF RECORD A MAXIMUM OF _ 3 DAYS AFTER PERFORMING SUCH INSPECTION. SUBMIT INSPECTION REPORTS TO THE BUILDING DEPARTMENT MONTHLY OR AS REQUESTED BY THE BUILDING OFFICIAL.
5. THE PRESENCE OF A SPECIAL INSPECTOR IN NO WAY LESSENS THE RESPONSIBILITY OF THE CONTRACTOR TO BUILD A QUALITY STRUCTURE IN TOTAL COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS. THE SPECIAL INSPECTOR SHALL IMMEDIATELY NOTIFY THE STRUCTURAL ENGINEER OF RECORD IF THERE IS ANY FAILURE BY THE CONTRACTOR TO CONFORM TO CONSTRUCTION DOCUMENTS.



ULTIMATE C&C WIND PRESSURES (ASCE 7-10)

BUILDING	a (FT)	Vult (MPH)	Vasd (MPH)	A (SF)	ZONE 1 (PSF)	ZONE 2 (PSF)	ZONE 3 (PSF)	ZONE 4 (PSF)	ZONE 5 (PSF)	ZONE 2H (PSF)	ZONE 3H (PSF)
MAIN	5.5	154	119	<10	+22.2 -54.5	+49.9 -91.5	+49.9 -91.5	+49.9 -54.1	+49.9 -66.5	- -78.6	- -78.6
				20	+20.8 -53.1	+47.7 -81.8	+47.7 -81.8	+47.7 -51.9	+47.7 -62.1	- -	- -
				50	+19 -51.3	+44.8 -68.9	+44.8 -68.9	+44.8 -48.9	+44.8 -56.3	- -	- -
				100+	+17.6 -49.9	+42.6 -59.1	+42.6 -59.1	+42.6 -46.7	+42.6 -51.9	- -	- -

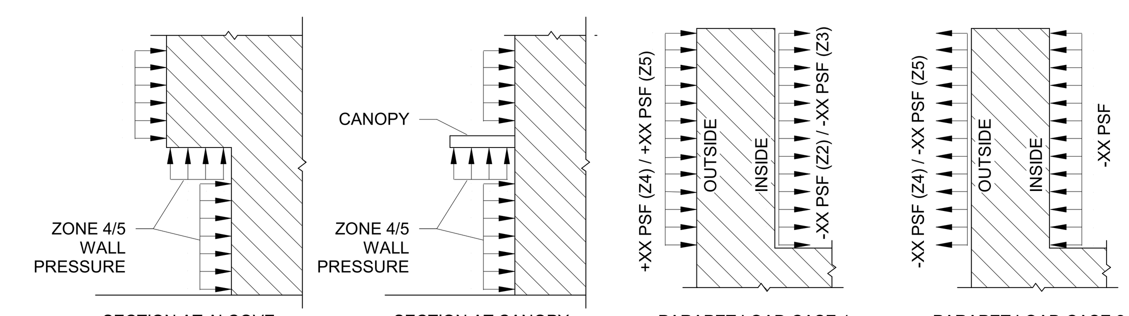
ULTIMATE C&C WIND PRESSURES (ASCE 7-10)

BUILDING	a (FT)	Vult (MPH)	Vasd (MPH)	A (SF)	ZONE 1 (PSF)	ZONE 2 (PSF)	ZONE 3 (PSF)
CANOPY	3.0	154	119	≤9	+47.1 -42.7	+70.6 -65.7	+94.1 -128.2
				9< A ≤36	+47.1 -42.7	+70.6 -65.7	+70.6 -65.7
				>36	+47.1 -42.7	+47.1 -42.7	+47.1 -42.7

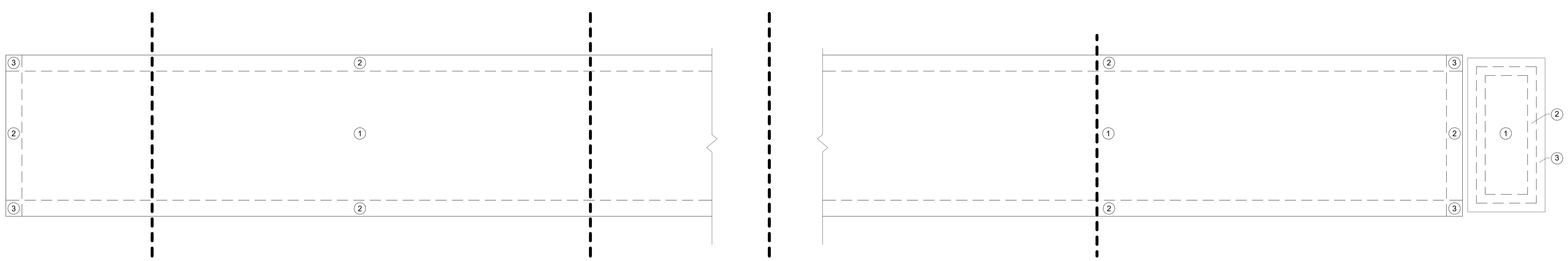
ULTIMATE C&C WIND PRESSURE PLAN NOTES:

1. WIND PRESSURE TABLE IS BASED ON FBC 2014/ASCE 7-10 ULTIMATE WIND SPEED, PRESSURES SHOWN ABOVE ARE ULTIMATE COMPONENTS AND CLADDING PRESSURES.

   A - INDICATES TRIBUTARY AREA IN S.F.
   a - INDICATES END ZONE WIDTH IN FT.
   Vult - INDICATES ULTIMATE DESIGN WIND SPEED IN MPH
   Vasd - INDICATES NOMINAL DESIGN WIND SPEED IN MPH
2. GROSS PRESSURES ARE FOR JOISTS, WINDOWS, DOORS, VENEER, LIGHT GAGE METAL FRAMING, METAL DECK ATTACHMENTS, ROOFING, ROOFING ACCESSORIES AND OTHER BUILDING COMPONENTS AND CLADDING.
3. GROSS PRESSURES SHALL BE LINEARLY INTERPOLATED FOR (A) NOT SHOWN IN TABLE.
4. POSITIVE PRESSURES INDICATE PRESSURES ACTING TOWARD A PROJECTED SURFACE. NEGATIVE PRESSURES INDICATE PRESSURES ACTING AWAY FROM A PROJECTED SURFACE.
5. ROOF AND ZONES (1) THRU (3)
6. WALL ZONES (4) AND (5)
7. OVERHANG ZONES (2H) AND (3H) APPLY ONLY TO ROOF OVERHANGS WHERE THE COMPONENT OR CLADDING RECEIVES PRESSURE SIMULTANEOUSLY ON BOTH SIDES (UPWARD SUCTION ON TOP AND UPWARD PRESSURE ON BOTTOM, SUCH AS AT OPEN SOFFITS), AND IS CONTINUOUS WITH FIELD OF ROOF.
8. NET DESIGN ROOF PRESSURES SHALL BE CALCULATED USING THE SELFWEIGHT (DEAD LOAD) OF THE MATERIALS. HOWEVER, THE MAXIMUM REDUCTION OF WIND UPLIFT PRESSURES SHALL BE LIMITED TO THE SELF WEIGHT OF THE ROOF SYSTEM PLUS 5 PSF FOR SUPERIMPOSED DEAD LOADS.
9. INTERNAL PRESSURE COEFFICIENT FOR ENCLOSED BUILDING EQUALS +0.18 AND -0.18
   INTERNAL PRESSURE COEFFICIENT FOR OPEN STRUCTURE EQUALS +/- 0.00
   INTERNAL PRESSURE COEFFICIENT FOR PARTIALLY ENCLOSED STRUCTURE EQUALS +/- 0.55
10. ROOF TOP EQUIPMENT SHALL BE DESIGNED FOR A LATERAL PRESSURE OF 90 PSF AND A SIMULTANEOUS UPLIFT PRESSURE OF 70 PSF (ROOF TOP EQUIPMENT PER FBC SECTION 1620.6 WITH Qh = 47 PSF)
11. AT ALCOVES AND CANOPIES, THE TOTAL UPLIFT PRESSURE ON THE ALCOVE SOFFIT OR CANOPY SHALL EQUAL THE WALL PRESSURE IN THAT AREA.
12. PARAPET DESIGN WIND PRESSURE LOAD CASES:
    LOAD CASE 1: OUTSIDE FACE: +49.9 PSF (ZONE 4) AND +49.9 PSF (ZONE 5)
    INSIDE FACE: -91.5 PSF (ZONE 2) AND -91.5 PSF (ZONE 3)
    LOAD CASE 2: OUTSIDE FACE: -54.1 PSF (ZONE 4) AND -66.5 PSF (ZONE 5)
    INSIDE FACE: +49.9 PSF (ZONE 4) AND +49.9 PSF (ZONE 5)
    NOTE THAT CASE 1 & CASE 2 WIND PRESSURES ARE APPLIED INDEPENDENTLY.
13. SCREENWALL DESIGN WIND PRESSURE SHALL BE +/-67 PSF.



SECTION AT ALCOVE
SECTION AT CANOPY
PARAPET LOAD CASE 1
PARAPET LOAD CASE 2



2 S003 ROOF FRAMING PLAN - OVERALL
1" = 20'-0"

THIS BUILDING IS CLASSIFIED AS A "THRESHOLD BUILDING" SPECIAL INSPECTION OF THE CONSTRUCTION IS REQUIRED BY THE STATE OF FLORIDA IN ACCORDANCE WITH CHAPTER 553 OF THE FLORIDA STATUTES. CONSTRUCTION SHALL BE INSPECTED IN ACCORDANCE WITH THE SPECIAL INSPECTION PLAN.

OKALOOSA COUNTY

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Key Plan

Project No.:	MLM-19672
Designed By:	Designer
Drawn By:	Author
Checked By:	Checker
Issue Date:	30-NOV-2020
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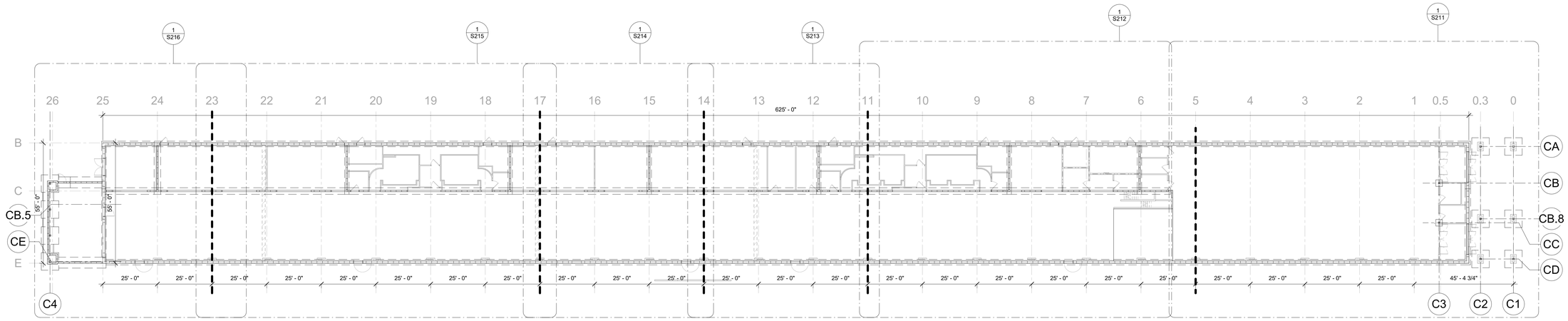
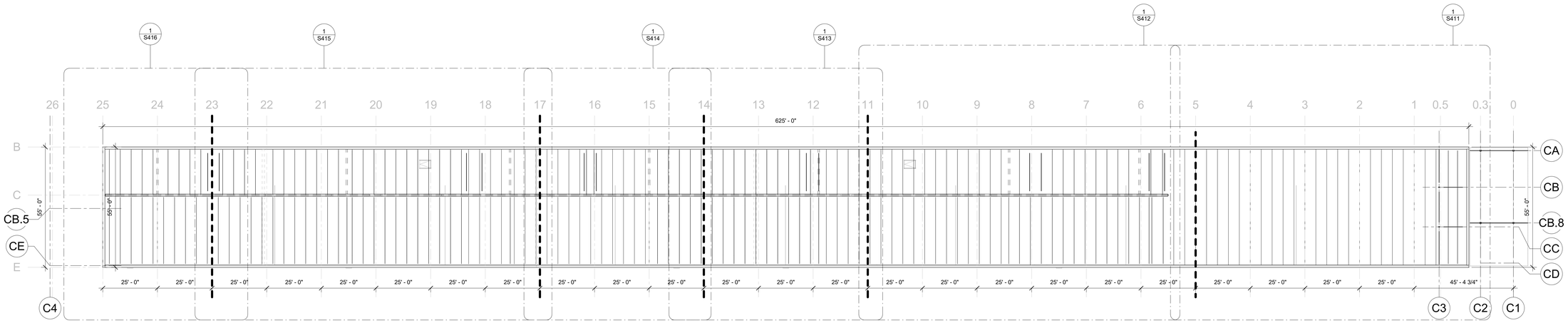
Drawing Title:
STR NOTES CONT. AND COMPONENT WIND CRITERIA
BID DOCUMENTS

Drawing No.:
S003



1 S210 FOUNDATION PLAN - OVERALL

1" = 20'-0"



2 S210 ROOF FRAMING PLAN - OVERALL

1" = 20'-0"

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Key Plan

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Designed By:	JFS
Drawn By:	SVW
Checked By:	JFS
Issue Date:	30-NOV-2020
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OVERALL STRUCTURAL FLOOR PLANS

BID DOCUMENTS

Drawing No.:

S210

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CMU WALL SCHEDULE

MARK	WIDTH	REINFORCEMENT	REMARKS
CMU-1	7 5/8"	#6 BARS AT 32" OC	
CMU-2	11 5/8"	#6 BARS AT 24" OC	
CMU-3	7 5/8"	#6 BARS AT 32" OC	#6 DOWELS AT 8" OC

WALL FOOTING SCHEDULE

MARK	WIDTH	THICKNESS	TRANSVERSE BARS	LONG BARS	REMARKS
WF-2.0	2'-0"	12"	#5 AT 12" OC	(3) #5	
WF-2.5	2'-6"	14"	#5 AT 12" OC	(3) #5	
WF-3.0	3'-0"	14"	#5 AT 12" OC	(3) #5	
WF-5.0	5'-0"	14"	#6 AT 12" OC	(5) #6	TOP AND BOTTOM

COLUMN FOOTING SCHEDULE

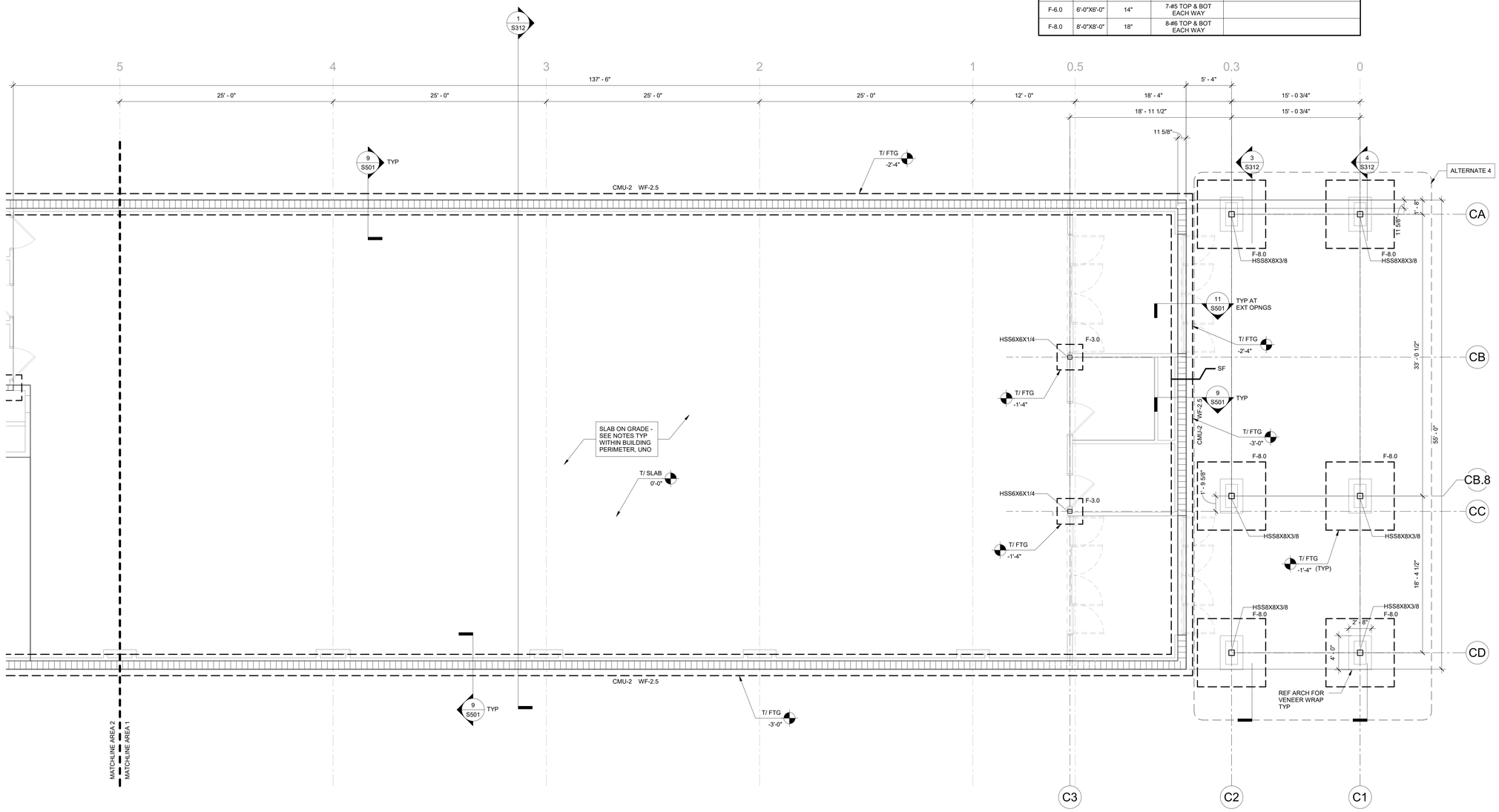
MARK	SIZE	THICKNESS	REINFORCEMENT	REMARKS
F-3.0	3'-0"X3'-0"	12"	4-#5 TOP & BOT EACH WAY	
F-6.0	6'-0"X6'-0"	14"	7-#5 TOP & BOT EACH WAY	
F-8.0	8'-0"X8'-0"	18"	8-#6 TOP & BOT EACH WAY	

FOUNDATION PLAN NOTES

1. TOP OF SLAB ELEVATION TO VARIES, SEE PLAN.
2. UNO SLAB SHALL BE 4" CONCRETE SLAB ON GRADE REINFORCED w/ 6x6 W4.0XW4.0 WWF OVER 15 MIL VAPOR BARRIER AND COMPACTED FILL.
3. TOP OF FOOTING ELEVATION = SEE PLAN.
4. SEE ARCH DWGS FOR LOCATION AND LIMITS/EXTENTS OF STRUCTURAL CMU WALLS SHOWN ON PLAN, TYPICAL.

FOUNDATION KEY NOTES

1. PROVIDE ADD'L TOP BARS TO MATCH BOTTOM REINF. FOR 10'-0" LONG ZONE, CENTERED AT THE SHEAR WALL/FTG INTERSECTION, U.N.O. PROVIDE LONGER ZONE WHERE INDICATED ON PLAN.
2. LOCATION OF BID ALTERNATE EXTENTS. PROVIDE DESIGNS/DETAILS INDICATED SHOULD THIS BE THE TERMINATION POINT FOR THE BUILDING.
3. IF ALTERNATE WALL (AS NOTED IN ITEM 2) IS SELECTED AS TERMINATION OF BUILDING, WALL IDENTIFIED BY THIS NOTE SHALL BE DELETED FROM SCOPE.



1 S211 FOUNDATION PLAN - AREA 1

3/16" = 1'-0"

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Key Plan

Project No.:	MLM-19672
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Drawn By:	SVW
Checked By:	JFS
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ENLARGED FOUNDATION PLAN - AREA 1

BID DOCUMENTS

Drawing No.:

S211

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12/1/2020 9:04:22 AM

CMU WALL SCHEDULE

MARK	WIDTH	REINFORCEMENT	REMARKS
CMU-1	7 5/8"	#6 BARS AT 32" OC	
CMU-2	11 5/8"	#6 BARS AT 24" OC	
CMU-3	7 5/8"	#6 BARS AT 32" OC	#6 DOWELS AT 8" OC

WALL FOOTING SCHEDULE

MARK	WIDTH	THICKNESS	TRANSVERSE BARS	LONG BARS	REMARKS
WF-2.0	2'-0"	12"	#5 AT 12" OC	(3) #5	
WF-2.5	2'-6"	14"	#5 AT 12" OC	(3) #5	
WF-3.0	3'-0"	14"	#5 AT 12" OC	(3) #5	
WF-5.0	5'-0"	14"	#6 AT 12" OC	(5) #6	TOP AND BOTTOM

COLUMN FOOTING SCHEDULE

MARK	SIZE	THICKNESS	REINFORCEMENT	REMARKS
F-3.0	3'-0"X3'-0"	12"	4-#5 TOP & BOT EACH WAY	
F-6.0	6'-0"X6'-0"	14"	7-#5 TOP & BOT EACH WAY	
F-8.0	8'-0"X8'-0"	18"	8-#6 TOP & BOT EACH WAY	

FOUNDATION PLAN NOTES

1. TOP OF SLAB ELEVATION TO VARIES, SEE PLAN.
2. UNO SLAB SHALL BE 4" CONCRETE SLAB ON GRADE REINFORCED w/ 6x6 W4.0XW4.0 WWF OVER 15 MIL VAPOR BARRIER AND COMPACTED FILL.
3. TOP OF FOOTING ELEVATION = SEE PLAN.
4. SEE ARCH DWGS FOR LOCATION AND LIMITS/EXTENTS OF STRUCTURAL CMU WALLS SHOWN ON PLAN, TYPICAL.

FOUNDATION KEY NOTES

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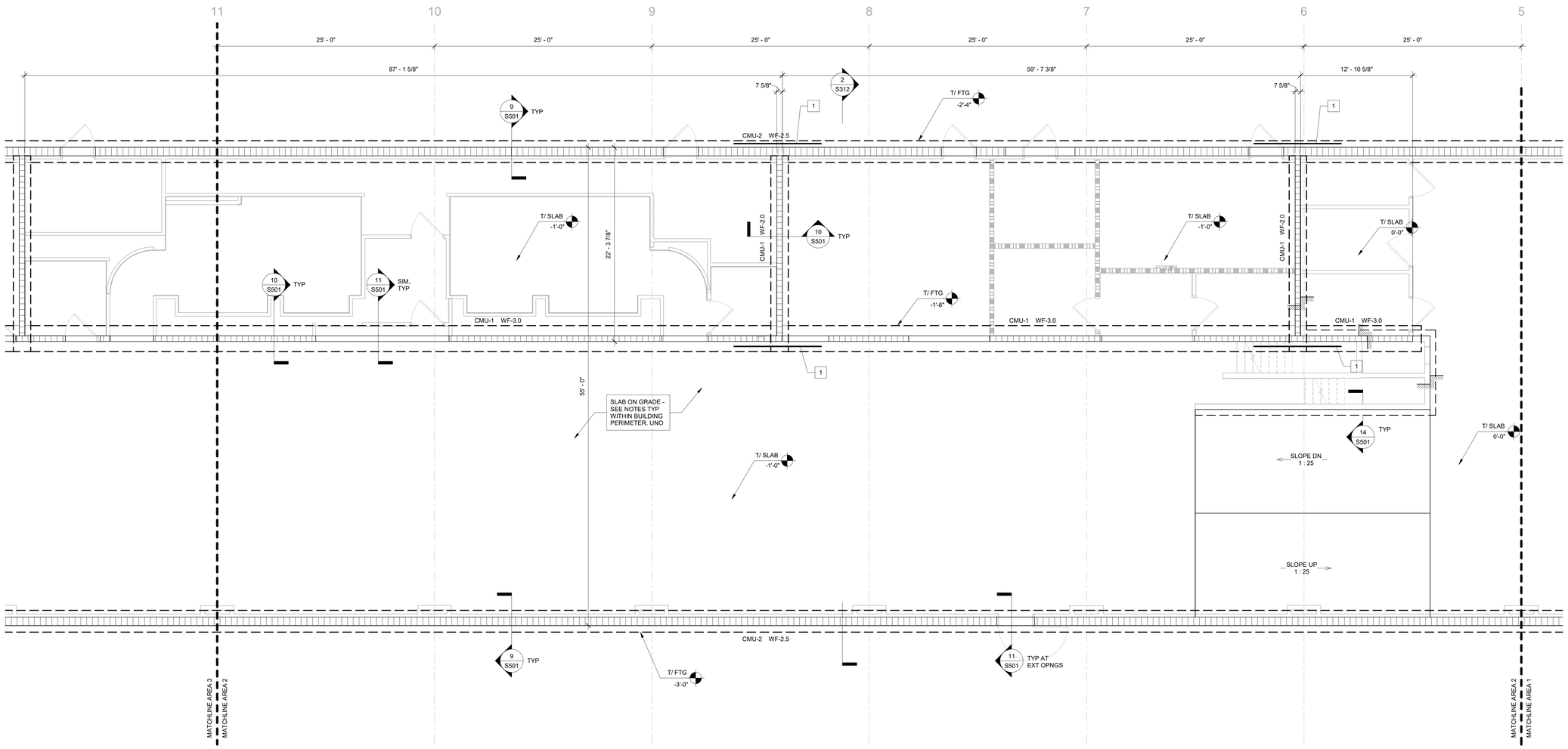

1 / S212 FOUNDATION PLAN - AREA 2

3/16" = 1'-0"

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Key Plan

Project No.:	MLM-19672
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Drawn By:	SVW
Checked By:	JFS
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ENLARGED FOUNDATION PLAN - AREA 2

BID DOCUMENTS

Drawing No.:

S212

BIM 360://Design of Satellite Concourse/VPS-MLM-S.rvt

12/1/2020 9:04:24 AM

CMU WALL SCHEDULE

MARK	WIDTH	REINFORCEMENT	REMARKS
CMU-1	7 5/8"	#6 BARS AT 32" OC	
CMU-2	11 5/8"	#6 BARS AT 24" OC	
CMU-3	7 5/8"	#6 BARS AT 32" OC	#6 DOWELS AT 8" OC

WALL FOOTING SCHEDULE

MARK	WIDTH	THICKNESS	TRANSVERSE BARS	LONG BARS	REMARKS
WF-2.0	2'-0"	12"	#5 AT 12" OC	(3) #5	
WF-2.5	2'-6"	14"	#5 AT 12" OC	(3) #5	
WF-3.0	3'-0"	14"	#5 AT 12" OC	(3) #5	
WF-5.0	5'-0"	14"	#6 AT 12" OC	(5) #6	TOP AND BOTTOM

COLUMN FOOTING SCHEDULE

MARK	SIZE	THICKNESS	REINFORCEMENT	REMARKS
F-3.0	3'-0"X3'-0"	12"	4-#5 TOP & BOT EACH WAY	
F-6.0	6'-0"X6'-0"	14"	7-#5 TOP & BOT EACH WAY	
F-8.0	8'-0"X8'-0"	18"	8-#6 TOP & BOT EACH WAY	

FOUNDATION PLAN NOTES

1. TOP OF SLAB ELEVATION TO VARIES, SEE PLAN.
2. UNO SLAB SHALL BE 4" CONCRETE SLAB ON GRADE REINFORCED w/ 6x6 W4.0XW4.0 WWF OVER 15 MIL VAPOR BARRIER AND COMPACTED FILL.
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4. SEE ARCH DWGS FOR LOCATION AND LIMITS/EXTENTS OF STRUCTURAL CMU WALLS SHOWN ON PLAN, TYPICAL.

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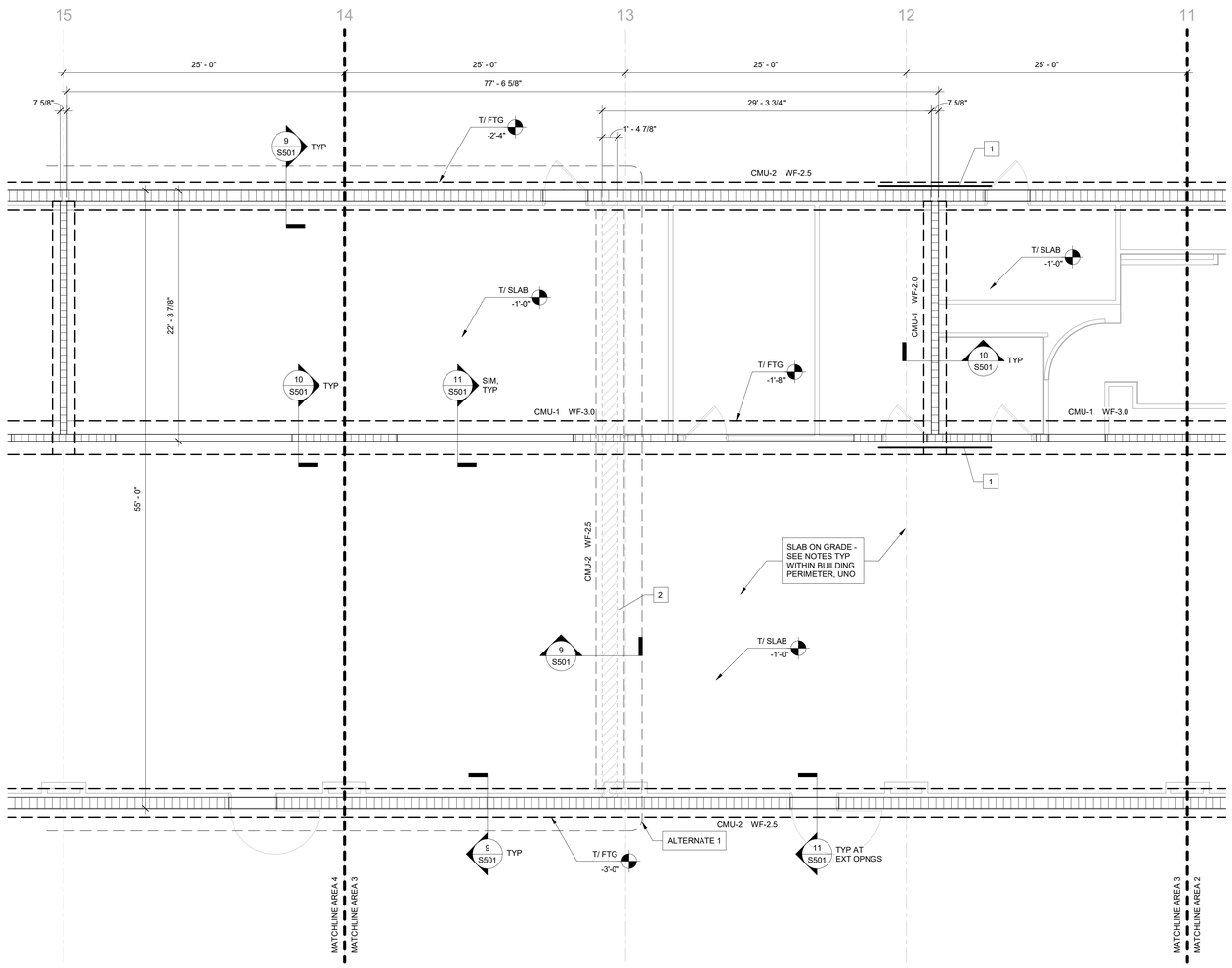

1 / S213 FOUNDATION PLAN - AREA 3

3/16" = 1'-0"

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OKALOOSA COUNTY

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Drawn By:	SVW
Checked By:	JFS
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ENLARGED FOUNDATION PLAN - AREA 3

BID DOCUMENTS

Drawing No.:

S213

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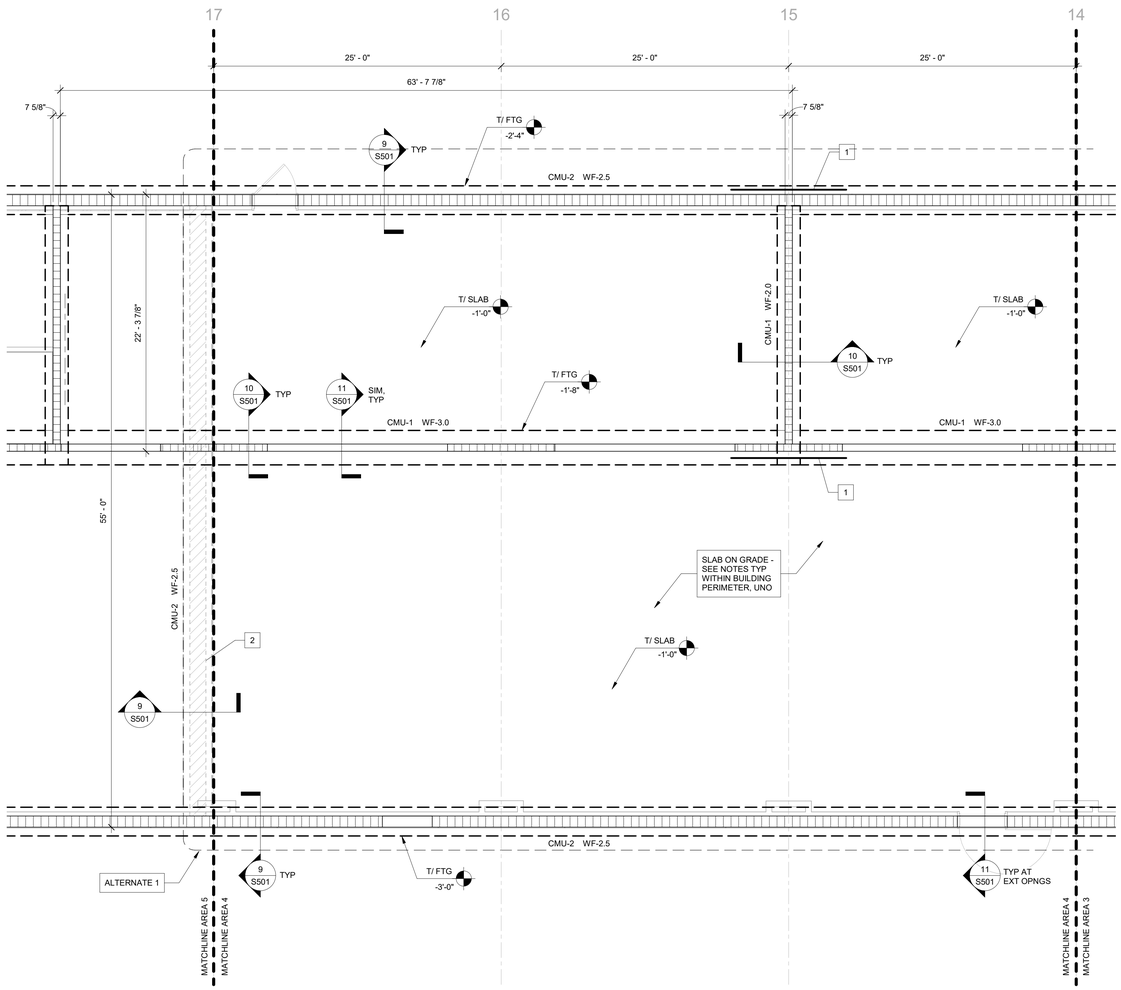

1 S214 FOUNDATION PLAN - AREA 4

3/16" = 1'-0"

CMU WALL SCHEDULE			
MARK	WIDTH	REINFORCEMENT	REMARKS
CMU-1	7 5/8"	#6 BARS AT 32" OC	
CMU-2	11 5/8"	#6 BARS AT 24" OC	
CMU-3	7 5/8"	#6 BARS AT 32" OC	#6 DOWELS AT 8" OC

WALL FOOTING SCHEDULE					
MARK	WIDTH	THICKNESS	TRANSVERSE BARS	LONG BARS	REMARKS
WF-2.0	2'-0"	12"	#5 AT 12" OC	(3) #5	
WF-2.5	2'-6"	14"	#5 AT 12" OC	(3) #5	
WF-3.0	3'-0"	14"	#5 AT 12" OC	(3) #5	
WF-5.0	5'-0"	14"	#6 AT 12" OC	(5) #6	TOP AND BOTTOM

COLUMN FOOTING SCHEDULE				
MARK	SIZE	THICKNESS	REINFORCEMENT	REMARKS
F-3.0	3'-0"X3'-0"	12"	4-#5 TOP & BOT EACH WAY	
F-6.0	6'-0"X6'-0"	14"	7-#5 TOP & BOT EACH WAY	
F-8.0	8'-0"X8'-0"	18"	8-#6 TOP & BOT EACH WAY	

FOUNDATION PLAN NOTES

1. TOP OF SLAB ELEVATION TO VARIES, SEE PLAN.
2. UNO SLAB SHALL BE 4" CONCRETE SLAB ON GRADE REINFORCED w/ 6x6 W4.0XW4.0 WWF OVER 15 MIL VAPOR BARRIER AND COMPACTED FILL.
3. TOP OF FOOTING ELEVATION = SEE PLAN.
4. SEE ARCH DWGS FOR LOCATION AND LIMITS/EXTENTS OF STRUCTURAL CMU WALLS SHOWN ON PLAN, TYPICAL.

FOUNDATION KEY NOTES

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OKALOOSA COUNTY

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Key Plan

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Drawn By:	SVW
Checked By:	JFS
Issue Date:	30-NOV-2020
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ENLARGED FOUNDATION PLAN - AREA 4

BID DOCUMENTS

Drawing No.:

S214

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12/1/2020 9:04:26 AM

CMU WALL SCHEDULE

MARK	WIDTH	REINFORCEMENT	REMARKS
CMU-1	7 5/8"	#6 BARS AT 32" OC	
CMU-2	11 5/8"	#6 BARS AT 24" OC	
CMU-3	7 5/8"	#6 BARS AT 32" OC	#6 DOWELS AT 8" OC

WALL FOOTING SCHEDULE

MARK	WIDTH	THICKNESS	TRANSVERSE BARS	LONG BARS	REMARKS
WF-2.0	2'-0"	12"	#5 AT 12" OC	(3) #5	
WF-2.5	2'-6"	14"	#5 AT 12" OC	(3) #5	
WF-3.0	3'-0"	14"	#5 AT 12" OC	(3) #5	
WF-5.0	5'-0"	14"	#6 AT 12" OC	(5) #6	TOP AND BOTTOM

COLUMN FOOTING SCHEDULE

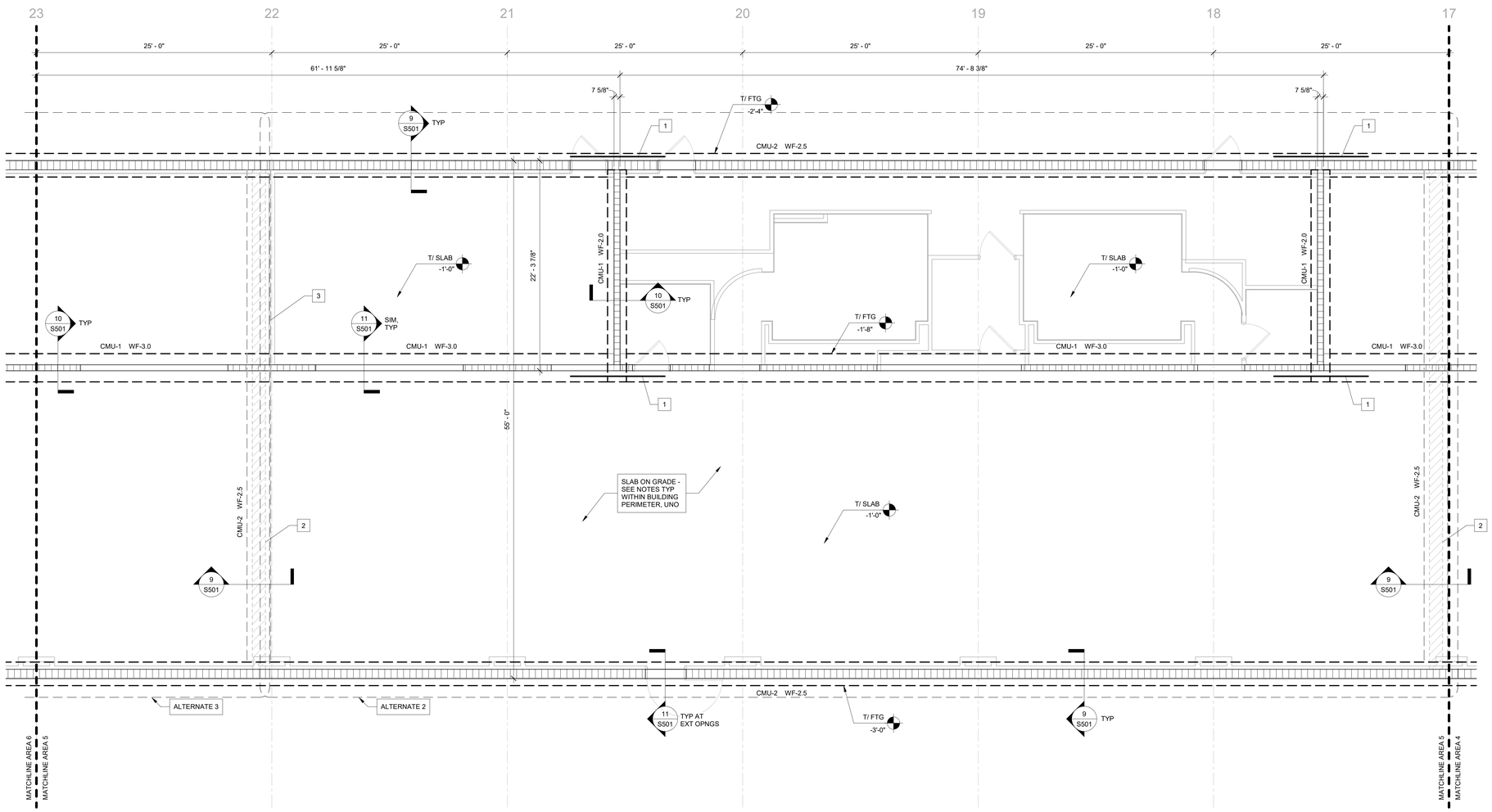
MARK	SIZE	THICKNESS	REINFORCEMENT	REMARKS
F-3.0	3'-0"X3'-0"	12"	4-#5 TOP & BOT EACH WAY	
F-6.0	6'-0"X6'-0"	14"	7-#5 TOP & BOT EACH WAY	
F-8.0	8'-0"X8'-0"	18"	8-#6 TOP & BOT EACH WAY	

FOUNDATION PLAN NOTES

1. TOP OF SLAB ELEVATION TO VARIES, SEE PLAN.
2. UNO SLAB SHALL BE 4" CONCRETE SLAB ON GRADE REINFORCED w/ 6x6 W4.0XW4.0 WWF OVER 15 MIL VAPOR BARRIER AND COMPACTED FILL.
3. TOP OF FOOTING ELEVATION = SEE PLAN.
4. SEE ARCH DWGS FOR LOCATION AND LIMITS/EXTENTS OF STRUCTURAL CMU WALLS SHOWN ON PLAN, TYPICAL.

FOUNDATION KEY NOTES

1. PROVIDE ADD'L TOP BARS TO MATCH BOTTOM REINF. FOR 10'-0" LONG ZONE, CENTERED AT THE SHEAR WALL/FTG INTERSECTION, U.N.O. PROVIDE LONGER ZONE WHERE INDICATED ON PLAN.
2. LOCATION OF BID ALTERNATE EXTENTS. PROVIDE DESIGNS/DETAILS INDICATED SHOULD THIS BE THE TERMINATION POINT FOR THE BUILDING.
3. IF ALTERNATE WALL (AS NOTED IN ITEM 2) IS SELECTED AS TERMINATION OF BUILDING, WALL IDENTIFIED BY THIS NOTE SHALL BE DELETED FROM SCOPE.



1 S215 FOUNDATION PLAN - AREA 5

3/16" = 1'-0"

THIS BUILDING IS CLASSIFIED AS A "THRESHOLD BUILDING" SPECIAL INSPECTION OF THE CONSTRUCTION IS REQUIRED BY THE STATE OF FLORIDA IN ACCORDANCE WITH CHAPTER 553 OF THE FLORIDA STATUTES. CONSTRUCTION SHALL BE INSPECTED IN ACCORDANCE WITH THE SPECIAL INSPECTION PLAN.

OKALOOSA COUNTY

FLY VPS

CI 9-2811-AP Construction of Satellite Concourse 'C'

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MLM JOB #: TYPE PROPERTY

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SEAL

Revisions

No.	Date	Description

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TLC No.:7190055
THINK. LISTEN. CREATE.

Key Plan

Project No.:	MLM-19672
Designed By:	JFS
Drawn By:	SVW
Checked By:	JFS
Issue Date:	30-NOV-2020
Drawing Scale:	As indicated

Drawing Title:

ENLARGED FOUNDATION PLAN - AREA 5

BID DOCUMENTS

Drawing No.:

S215

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12/1/2020 9:04:27 AM

CMU WALL SCHEDULE

MARK	WIDTH	REINFORCEMENT	REMARKS
CMU-1	7 5/8"	#6 BARS AT 32" OC	
CMU-2	11 5/8"	#6 BARS AT 24" OC	
CMU-3	7 5/8"	#6 BARS AT 32" OC	#6 DOWELS AT 8" OC

WALL FOOTING SCHEDULE

MARK	WIDTH	THICKNESS	TRANSVERSE BARS	LONG BARS	REMARKS
WF-2.0	2'-0"	12"	#5 AT 12" OC	(3) #5	
WF-2.5	2'-6"	14"	#5 AT 12" OC	(3) #5	
WF-3.0	3'-0"	14"	#5 AT 12" OC	(3) #5	
WF-5.0	5'-0"	14"	#6 AT 12" OC	(5) #6	TOP AND BOTTOM

COLUMN FOOTING SCHEDULE

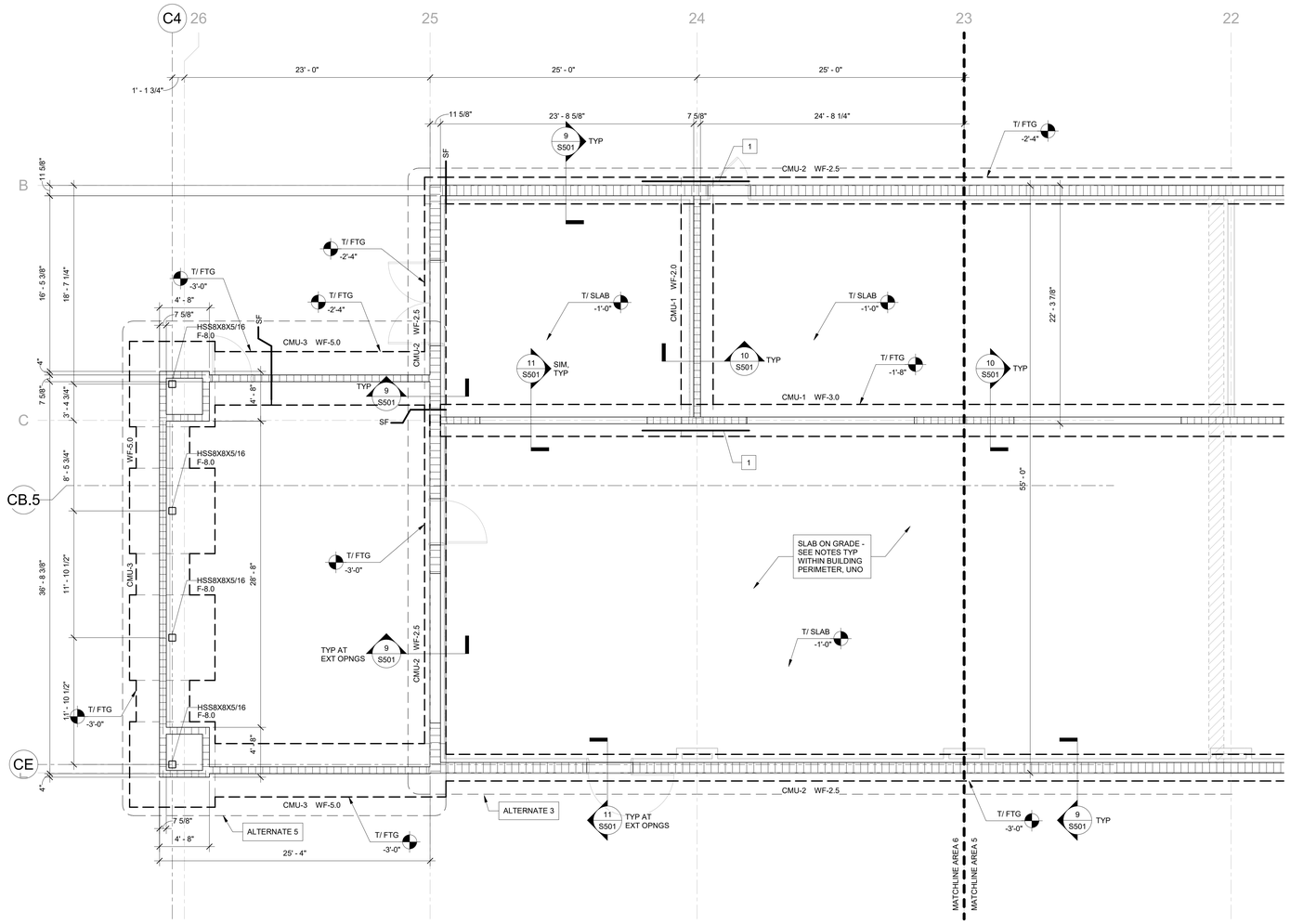
MARK	SIZE	THICKNESS	REINFORCEMENT	REMARKS
F-3.0	3'-0"X3'-0"	12"	4-#5 TOP & BOT EACH WAY	
F-6.0	6'-0"X6'-0"	14"	7-#5 TOP & BOT EACH WAY	
F-8.0	8'-0"X8'-0"	18"	8-#6 TOP & BOT EACH WAY	

FOUNDATION PLAN NOTES

1. TOP OF SLAB ELEVATION TO VARIES, SEE PLAN.
2. UNO SLAB SHALL BE 4" CONCRETE SLAB ON GRADE REINFORCED w/ 6x6 W4.0XW4.0 WWF OVER 15 MIL VAPOR BARRIER AND COMPACTED FILL.
3. TOP OF FOOTING ELEVATION = SEE PLAN.
4. SEE ARCH DWGS FOR LOCATION AND LIMITS/EXTENTS OF STRUCTURAL CMU WALLS SHOWN ON PLAN, TYPICAL.

FOUNDATION KEY NOTES

1. PROVIDE ADD'L TOP BARS TO MATCH BOTTOM REINF. FOR 10'-0" LONG ZONE, CENTERED AT THE SHEAR WALL/FTG INTERSECTION, U.N.O. PROVIDE LONGER ZONE WHERE INDICATED ON PLAN.
2. LOCATION OF BID ALTERNATE EXTENTS. PROVIDE DESIGNS/DETAILS INDICATED SHOULD THIS BE THE TERMINATION POINT FOR THE BUILDING.
3. IF ALTERNATE WALL (AS NOTED IN ITEM 2) IS SELECTED AS TERMINATION OF BUILDING, WALL IDENTIFIED BY THIS NOTE SHALL BE DELETED FROM SCOPE.



1 S216 FOUNDATION PLAN - AREA 6

3/16" = 1'-0"

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OKALOOSA COUNTY

FLY VPS

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Revisions

No.	Date	Description

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TLC No.:719055
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Key Plan

Project No.:	MLM-19672
Designed By:	JFS
Drawn By:	SVW
Checked By:	JFS
Issue Date:	30-NOV-2020
Drawing Scale:	As indicated

Drawing Title:

ENLARGED FOUNDATION PLAN - AREA 6

BID DOCUMENTS

Drawing No.:

S216

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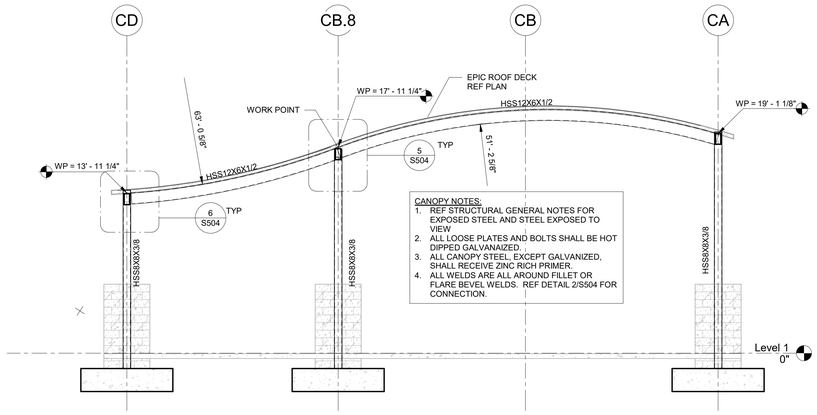
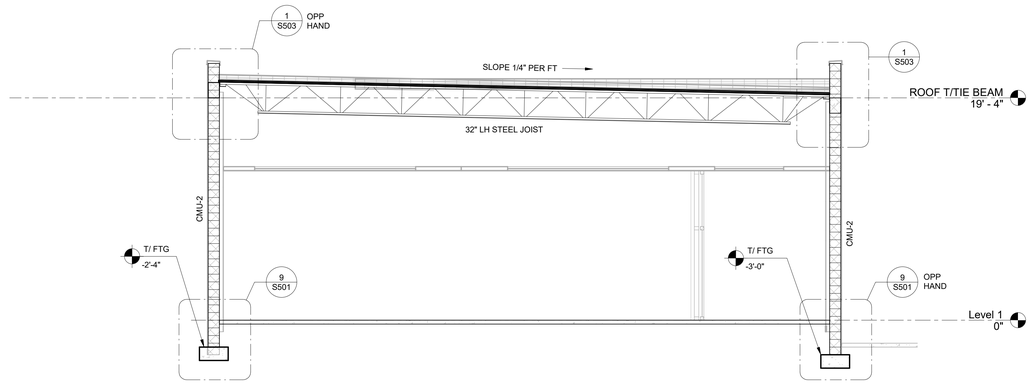


CANOPY NOTES:
1. REF STRUCTURAL GENERAL NOTES FOR EXPOSED STEEL AND STEEL EXPOSED TO VIEW
2. ALL LOOSE PLATES AND BOLTS SHALL BE HOT DIPPED GALVANAIZED.
3. ALL CANOPY STEEL, EXCEPT GALVANIZED, SHALL RECEIVE ZINC RICH PRIMER.
4. ALL WELDS ARE ALL AROUND FILLET OR FLARE BEVEL WELDS. REF DETAIL 2/S504 FOR CONNECTION.

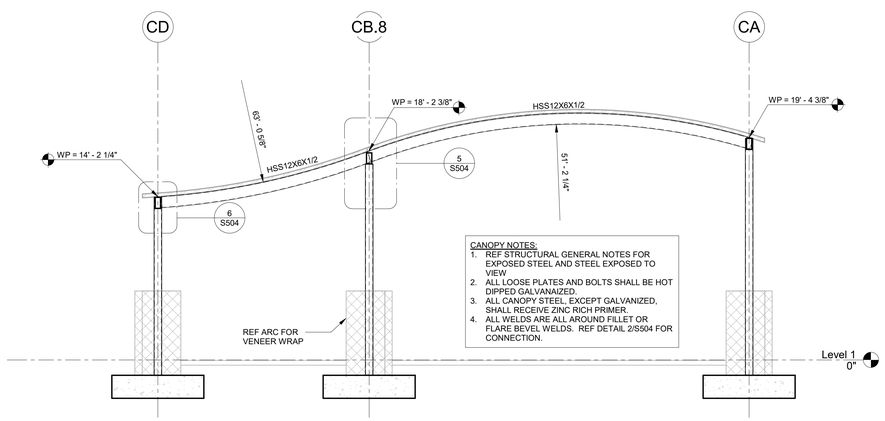
3 / S312 SECTION AT CANOPY - 1

3/16" = 1'-0"



1 / S312 SECTION THRU BUILDING

3/16" = 1'-0"



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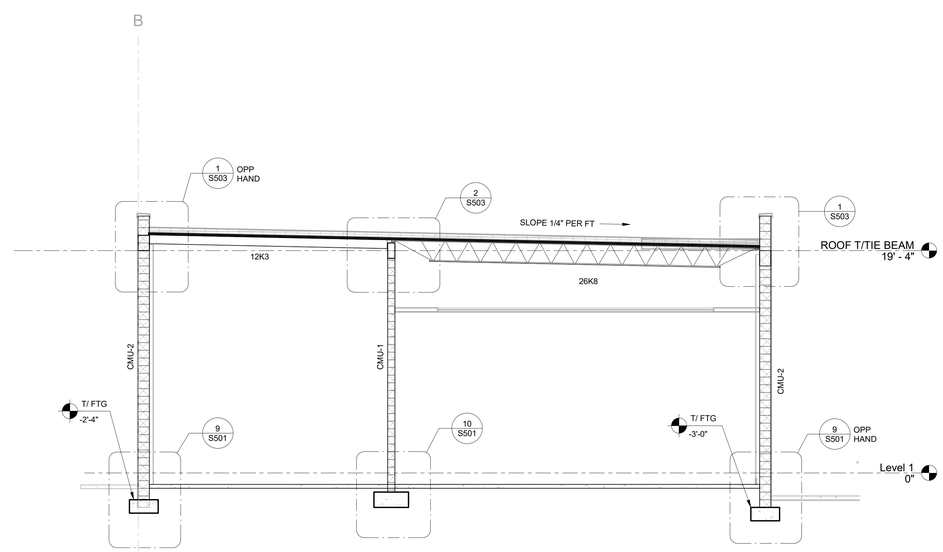
4. ALL WELDS ARE ALL AROUND FILLET OR FLARE BEVEL WELDS. REF DETAIL 2/S504 FOR CONNECTION.

4 / S312 SECTION AT CANOPY - 2

3/16" = 1'-0"



2 / S312 SECTION THRU BUILDING

3/16" = 1'-0"

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OKALOOSA COUNTY

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No.	Date	Description

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Key Plan

Project No.:	MLM-19672
Designed By:	JFS
Drawn By:	SVW
Checked By:	JFS
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:

BUILDING SECTIONS

BID DOCUMENTS

Drawing No.:

S312

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12/1/2020 9:04:28 AM

LINTEL SCHEDULE

MARK	TYPE	WIDTH	DEPTH	TOP BARS	BOTTOM BARS	REMARKS
L-1	8F24-1B/1T	8"	24"	(1) #5	(1) #5	PRESTRESSED CAST-CRETE
L-2	12F24-2B/2T	12"	24"	(2) #5	(2) #5	PRECAST CAST-CRETE

* REFER TO ARCHITECTURAL DRAWINGS/SPECS FOR AESTHETIC REQUIREMENTS OF LINTELS

TIE BEAM SCHEDULE

MARK	WIDTH	DEPTH	TOP BARS	BOTTOM BARS	TYP STIRRUPS	STIRRUPS OVER ALL MASONRY OPENINGS*
TB-1	8"	20"	(2) #6	(2) #8	#3 @ 16" OC	#3 @ 6" OC
TB-2A	12"	17 1/2"	(2) #8	(3) #8	#3 @ 16" OC	#3 @ 6" OC
TB-2B	12"	20"	(2) #8	(3) #8	#3 @ 16" OC	#3 @ 6" OC
TB-3	12"	20"	(2) #5	(2) #5	#3 @ 16" OC	#3 @ 6" OC
TB-4	8"	20"	(2) #5	(2) #5	#3 @ 16" OC	#3 @ 6" OC

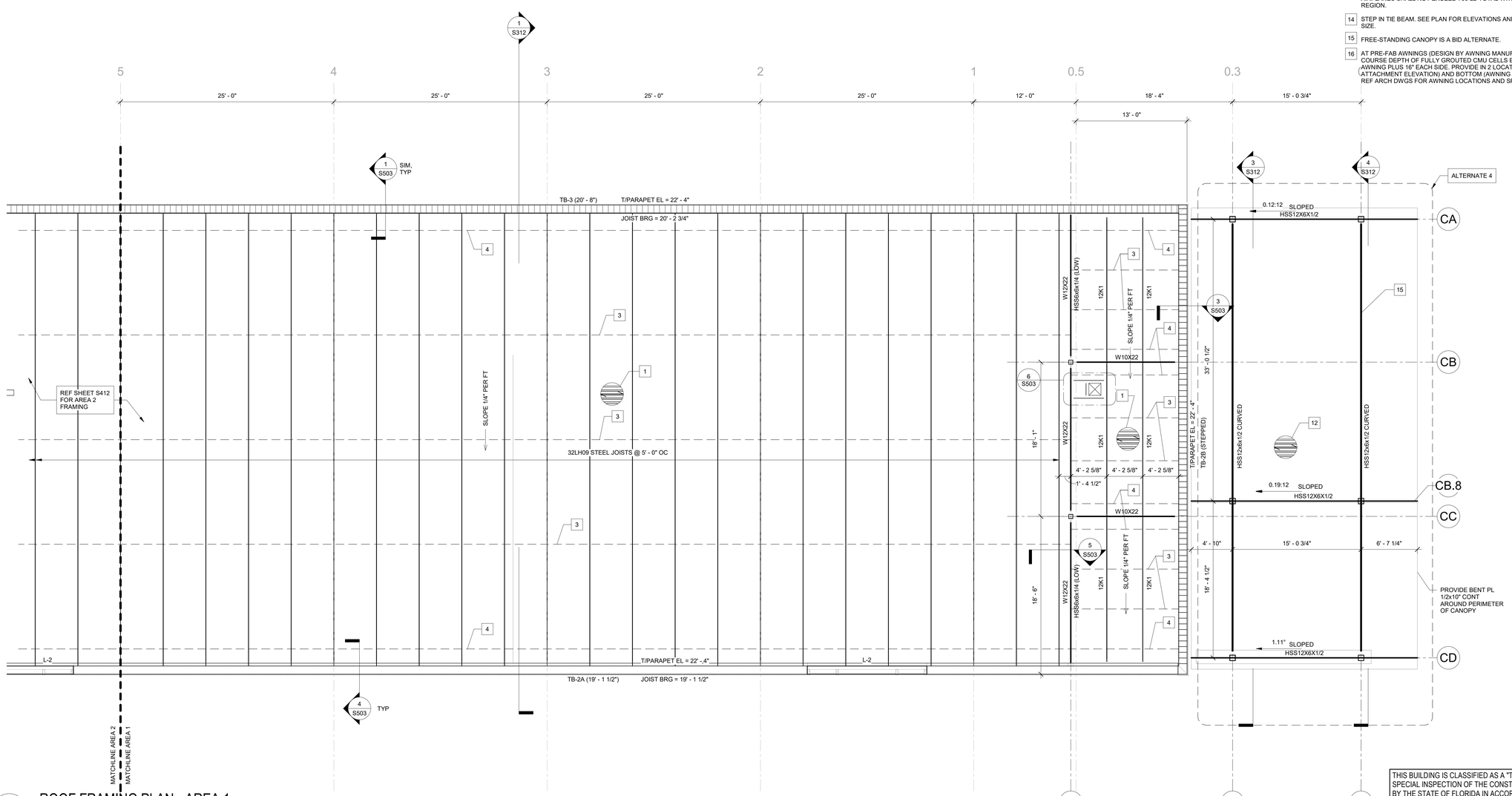
*TIE BEAM STIRRUP SPACING SHALL DECREASE PER THE SCHEDULE ALL ALL MASONRY OPENINGS, INCLUDING WHERE MASONRY LINTEL OCCURS BELOW.

FRAMING PLAN NOTES

1. TOP OF ROOF DECK AND TOP OF STRUCTURAL ELEVATION WILL VARY WITH THE ROOF SLOPE.
2. JOIST SEAT DEPTH SHALL BE SJI STANDARD FOR TYPE OF JOIST, U.N.O. SEAT DEPTH GIVEN IS TAKEN AT CENTERLINE OF GIRDER OR AT INSIDE FACE OF MASONRY.
3. JOIST MANUFACTURER TO DESIGN JOISTS FOR ADDITIONAL NET UPLIFT LOADS PER S003. PROVIDE BOTTOM CHORD JOIST BRACING PER 3/S503 AND 5/S503.
4. SIZE, LOCATION AND WEIGHT OF MECH UNIT SHALL BE CONFIRMED AND COORDINATED WITH MECH DWGS AND MECH CONTRACTOR/MANUFACTURER. WEIGHT OF UNIT (INCLUDING CURBS) SHALL NOT EXCEED THAT SHOWN ON THE PLAN. SEE 11/S503 FOR ADD'L FRAMING REQ'D AT MECH UNITS.
5. PROVIDE PRECAST LINTELS AT MASONRY OPENIGNS PER STRUCTURAL PLANS AND DETAILS. REFER TO ARCH FOR OPENING SIZE, LOCATION AND QUANTITY
6. REFER TO ARCH DWGS FOR EXPOSED STRUCTURE. SEE STRUCTURAL NOTES FOR ADD'L REQUIREMENTS AT THESE LOCATIONS.
7. U.N.O. JOIST SEAT DEPTHS SHALL BE STANDARD SJI SIZES 2 1/2" FOR K-SERIES, 5" FOR LH SERIES.

ROOF FRAMING KEY NOTES

1. 1 1/2" METAL ROOF DECK (GALVANIZED), SEE 7/S503.
2. ▶ INDICATES MOMENT CONNECTION.
3. TYPICAL TOP & BOTTOM CHORD CONTINUOUS BRIDGING BY JOIST MANUFACTURER. BRIDGING SHALL CONTINUE TO BOTH SIDES OF STEEL BEAMS PARALLEL TO STEEL JOISTS PER 5/S503, TYPICAL.
4. TYPICAL CONTINUOUS UPLIFT BRIDGING BY JOIST MANUFACTURER.
5. FUTURE MECHANICAL UNITS (2.0 KIPS EACH MAX), PERMISSIBLE IN HATCHED AREAS ON PLAN. JOIST MANUFACTURER TO DESIGN FOR ADDITIONAL LOAD AT APPLICABLE JOISTS.
6. JOIST MANUFACTURER TO DESIGN FOR ADDITIONAL +/- 2 KIP ALLOWABLE POINT LOAD AT X +/- 1'-0" ALONG STEEL JOIST.
7. PROVIDE STEEL FRAMING AT MECHANICAL UNITS PER 11/S503.
8. JOIST MANUFACTURER TO DESIGN FOR ADDITIONAL 200 PLF ALLOWABLE DEAD LOAD FOR X +/- 1'-0" ALONG STEEL JOIST. WHERE MEP UNIT DOES NOT ALIGN W/ JOIST, REF KEYNOTES 6 AND 7 FOR ALTERNATE DESIGN.
9. LOCATION OF BID ALTERNATE EXTENTS. PROVIDE DESIGNS/DETAILS INDICATED SHOULD THIS BE THE TERMINATION POINT FOR THE BUILDING.
10. IF ALTERNATE WALL (AS INDICATED IN KEYNOTE 9) IS SELECTED AS TERMINATION OF BUILDING, WALL IDENTIFIED BY THIS NOTE SHALL BE DELETED FROM SCOPE.
11. PRE-FABRICATED FABRIC CANOPY, BY CANOPY MANUFACTURER. REF ARCH FOR SPECIFICATIONS. OUTDOOR FURNISHINGS OR STRUCTURES SHALL NOT ATTACH TO OR BE SUPPORTED BY STRUCTURAL STEEL, TYP
12. EPIC TORUS 4 ROOF DECK, 18 GA., G90 - CURVED TO MATCH ARCHITECTURAL PROFILE. FASTENING PATTERN: DECK/DECK (SIDELAP): 1.5" FILLET WELDS AT 24" O.C. PER SPAN, TYP DECK/SUPPORT: 3/4" PUDDLE WELDS AT 24/3 PATTERN
13. PERMITTED AREA FOR MODEL AIRPLANE SUPPORTS. JOIST MANUFACTURER SHALL DESIGN JOISTS WITH TWO ADDITIONAL 300 LB POINT LOADS AT ANY LOCATION ALONG THE STEEL JOIST WITHIN HATCHED REGION. MODEL AIRPLANES SHALL NOT EXCEED 700 LB TOTAL WITHIN EACH HATCHED REGION.
14. STEP IN TIE BEAM. SEE PLAN FOR ELEVATIONS AND SCHEDULE FOR BEAM SIZE.
15. FREE-STANDING CANOPY IS A BID ALTERNATE.
16. AT PRE-FAB AWNINGS (DESIGN BY AWNING MANUFACTURER) PROVIDE 2 COURSE DEPTH OF FULLY GROUTED CMU CELLS EQUAL TO LENGTH OF AWNING PLUS 16" EACH SIDE. PROVIDE IN 2 LOCATIONS - AT TOP (TIE HANGER ATTACHMENT ELEVATION) AND BOTTOM (AWNING ATTACHMENT ELEVATION). REF ARCH DWGS FOR AWNING LOCATIONS AND SPECIFICATIONS.



1 S411 ROOF FRAMING PLAN - AREA 1

3/16" = 1'-0"

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OKALOOSA COUNTY

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Revisions

No.	Date	Description

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Key Plan

Project No.:	MLM-19672
Designed By:	JFS
Drawn By:	SVW
Checked By:	JFS
Issue Date:	30-NOV-2020
Drawing Scale:	As indicated

Drawing Title:

ENLARGED ROOF FRAMING PLAN - AREA 1

BID DOCUMENTS

Drawing No.:

S411

BIM 360://Design of Satellite Concourse/VPS-MLM-S.rvt

12/1/2020 9:04:30 AM

LINTEL SCHEDULE

MARK	TYPE	WIDTH	DEPTH	TOP BARS	BOTTOM BARS	REMARKS
L-1	8F24-1B/1T	8"	24"	(1) #5	(1) #5	PRESTRESSED CAST-CRETE
L-2	12F24-2B/2T	12"	24"	(2) #5	(2) #5	PRECAST CAST-CRETE

* REFER TO ARCHITECTURAL DRAWINGS/SPECS FOR AESTHETIC REQUIREMENTS OF LINTELS

TIE BEAM SCHEDULE

MARK	WIDTH	DEPTH	TOP BARS	BOTTOM BARS	TYP STIRRUPS	STIRRUPS OVER ALL MASONRY OPENINGS*
TB-1	8"	20"	(2) #6	(2) #8	#3 @ 16" OC	#3 @ 6" OC
TB-2A	12"	17 1/2"	(2) #8	(3) #8	#3 @ 16" OC	#3 @ 6" OC
TB-2B	12"	20"	(2) #8	(3) #8	#3 @ 16" OC	#3 @ 6" OC
TB-3	12"	20"	(2) #5	(2) #5	#3 @ 16" OC	#3 @ 6" OC
TB-4	8"	20"	(2) #5	(2) #5	#3 @ 16" OC	#3 @ 6" OC

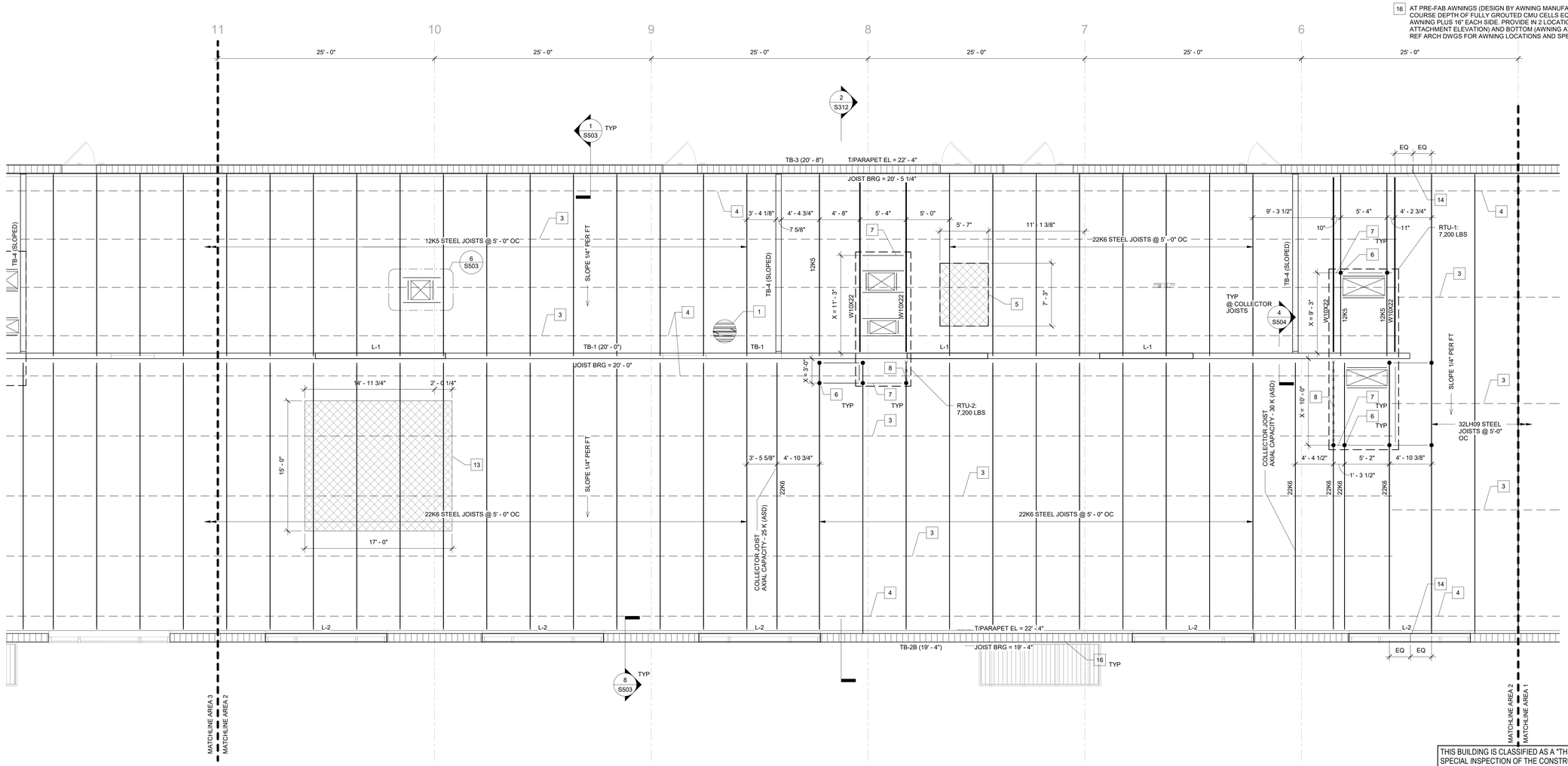
*TIE BEAM STIRRUP SPACING SHALL DECREASE PER THE SCHEDULE ALL ALL MASONRY OPENINGS, INCLUDING WHERE MASONRY LINTEL OCCURS BELOW.

FRAMING PLAN NOTES

1. TOP OF ROOF DECK AND TOP OF STRUCTURAL ELEVATION WILL VARY WITH THE ROOF SLOPE.
2. JOIST SEAT DEPTH SHALL BE SJI STANDARD FOR TYPE OF JOIST, U.N.O. SEAT DEPTH GIVEN IS TAKEN AT CENTERLINE OF GIRDER OR AT INSIDE FACE OF MASONRY.
3. JOIST MANUFACTURER TO DESIGN JOISTS FOR ADDITIONAL NET UPLIFT LOADS PER S003. PROVIDE BOTTOM CHORD JOIST BRACING PER 3/S503 AND 5/S503.
4. SIZE, LOCATION AND WEIGHT OF MECH UNIT SHALL BE CONFIRMED AND COORDINATED WITH MECH DWGS AND MECH CONTRACTOR/MANUFACTURER. WEIGHT OF UNIT (INCLUDING CURBS) SHALL NOT EXCEED THAT SHOWN ON THE PLAN. SEE 11/S503 FOR ADD'L FRAMING REQ'D AT MECH UNITS.
5. PROVIDE PRECAST LINTELS AT MASONRY OPENIGNS PER STRUCTURAL PLANS AND DETAILS. REFER TO ARCH FOR OPENING SIZE, LOCATION AND QUANTITY
6. REFER TO ARCH DWGS FOR EXPOSED STRUCTURE. SEE STRUCTURAL NOTES FOR ADD'L REQUIREMENTS AT THESE LOCATIONS.
7. U.N.O. JOIST SEAT DEPTHS SHALL BE STANDARD SJI SIZES 2 1/2" FOR K-SERIES, 5" FOR LH SERIES.

ROOF FRAMING KEY NOTES

1. 1 1/2" METAL ROOF DECK (GALVANIZED), SEE 7/S503.
2. ▶ INDICATES MOMENT CONNECTION.
3. TYPICAL TOP & BOTTOM CHORD CONTINUOUS BRIDGING BY JOIST MANUFACTURER. BRIDGING SHALL CONTINUE TO BOTH SIDES OF STEEL BEAMS PARALLEL TO STEEL JOISTS PER 5/S503, TYPICAL.
4. TYPICAL CONTINUOUS UPLIFT BRIDGING BY JOIST MANUFACTURER.
5. FUTURE MECHANICAL UNITS (2.0 KIPS EACH MAX), PERMISSIBLE IN HATCHED AREAS ON PLAN. JOIST MANUFACTURER TO DESIGN FOR ADDITIONAL LOAD AT APPLICABLE JOISTS.
6. JOIST MANUFACTURER TO DESIGN FOR ADDITIONAL +/- 2 KIP ALLOWABLE POINT LOAD AT X +/- 1'-0" ALONG STEEL JOIST.
7. PROVIDE STEEL FRAMING AT MECHANICAL UNITS PER 11/S503.
8. JOIST MANUFACTURER TO DESIGN FOR ADDITIONAL 200 PLF ALLOWABLE DEAD LOAD FOR X +/- 1'-0" ALONG STEEL JOIST. WHERE MEP UNIT DOES NOT ALIGN W/ JOIST, REF KEYNOTES 6 AND 7 FOR ALTERNATE DESIGN.
9. LOCATION OF BID ALTERNATE EXTENTS. PROVIDE DESIGNS/DETAILS INDICATED SHOULD THIS BE THE TERMINATION POINT FOR THE BUILDING.
10. IF ALTERNATE WALL (AS INDICATED IN KEYNOTE 9) IS SELECTED AS TERMINATION OF BUILDING, WALL IDENTIFIED BY THIS NOTE SHALL BE DELETED FROM SCOPE.
11. PRE-FABRICATED FABRIC CANOPY, BY CANOPY MANUFACTURER. REF ARCH FOR SPECIFICATIONS. OUTDOOR FURNISHINGS OR STRUCTURES SHALL NOT ATTACH TO OR BE SUPPORTED BY STRUCTURAL STEEL, TYP
12. EPIC TORUS 4 ROOF DECK, 18 GA., G90 - CURVED TO MATCH ARCHITECTURAL PROFILE. FASTENING PATTERN:
    DECK/DECK (SIDELAP): 1.5" FILLET WELDS AT 24" O.C. PER SPAN, TYP
    DECK/SUPPORT: 3/4" PUDDLE WELDS AT 24/3 PATTERN
13. PERMITTED AREA FOR MODEL AIRPLANE SUPPORTS. JOIST MANUFACTURER SHALL DESIGN JOISTS WITH TWO ADDITIONAL 300 LB POINT LOADS AT ANY LOCATION ALONG THE STEEL JOIST WITHIN HATCHED REGION. MODEL AIRPLANES SHALL NOT EXCEED 700 LB TOTAL WITHIN EACH HATCHED REGION.
14. STEP IN TIE BEAM. SEE PLAN FOR ELEVATIONS AND SCHEDULE FOR BEAM SIZE.
15. FREE-STANDING CANOPY IS A BID ALTERNATE.
16. AT PRE-FAB AWNINGS (DESIGN BY AWNING MANUFACTURER) PROVIDE 2 COURSE DEPTH OF FULLY GROUTED CMU CELLS EQUAL TO LENGTH OF AWNING PLUS 16" EACH SIDE. PROVIDE IN 2 LOCATIONS - AT TOP (TIE HANGER ATTACHMENT ELEVATION) AND BOTTOM (AWNING ATTACHMENT ELEVATION). REF ARCH DWGS FOR AWNING LOCATIONS AND SPECIFICATIONS.



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1 S412 ROOF FRAMING PLAN -AREA 2

3/16" = 1'-0"

OKALOOSA COUNTY

FLY VPS

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Key Plan

Project No.:	MLM-19672
Designed By:	JFS
Drawn By:	SVW
Checked By:	JFS
Issue Date:	30-NOV-2020
Drawing Scale:	As indicated

Drawing Title:

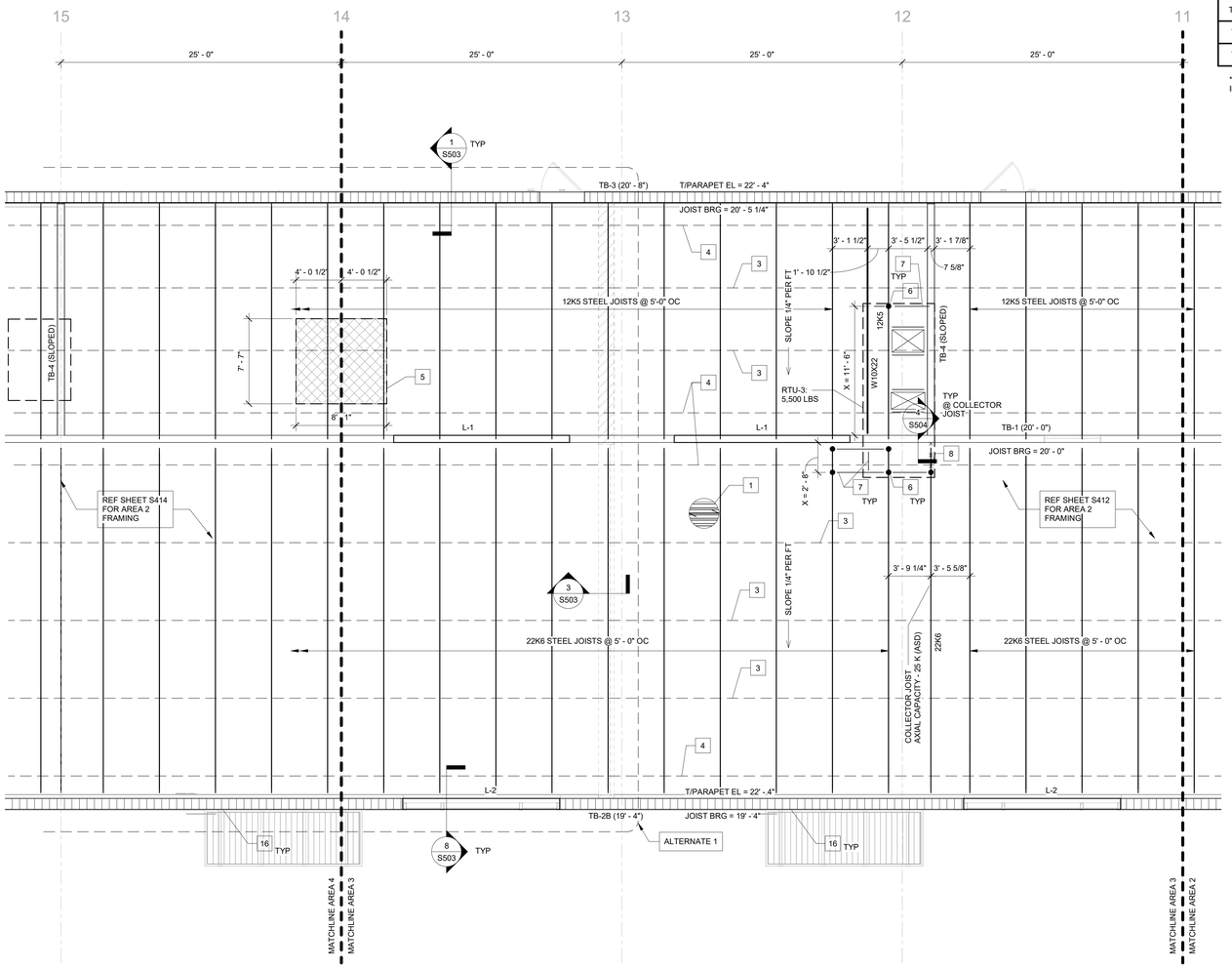
ENLARGED ROOF FRAMING PLAN - AREA 2

BID DOCUMENTS

Drawing No.:

S412

BIM 360://Design of Satellite Concourse/VPS-MLM-S.rvt
12/1/2020 9:04:32 AM



1
S413

ROOF FRAMING PLAN - AREA 3

3/16" = 1'-0"

LINTEL SCHEDULE

MARK	TYPE	WIDTH	DEPTH	TOP BARS	BOTTOM BARS	REMARKS
L-1	8F24-1B/1T	8"	24"	(1) #5	(1) #5	PRESTRESSED CAST-CRETE
L-2	12F24-2B/2T	12"	24"	(2) #5	(2) #5	PRECAST CAST-CRETE

* REFER TO ARCHITECTURAL DRAWINGS/SPECS FOR AESTHETIC REQUIREMENTS OF LINTELS

TIE BEAM SCHEDULE

MARK	WIDTH	DEPTH	TOP BARS	BOTTOM BARS	TYP STIRRUPS	STIRRUPS OVER ALL MASONRY OPENINGS*
TB-1	8"	20"	(2) #6	(2) #8	#3 @ 16" OC	#3 @ 6" OC
TB-2A	12"	17 1/2"	(2) #8	(3) #8	#3 @ 16" OC	#3 @ 6" OC
TB-2B	12"	20"	(2) #8	(3) #8	#3 @ 16" OC	#3 @ 6" OC
TB-3	12"	20"	(2) #5	(2) #5	#3 @ 16" OC	#3 @ 6" OC
TB-4	8"	20"	(2) #5	(2) #5	#3 @ 16" OC	#3 @ 6" OC

*TIE BEAM STIRRUP SPACING SHALL DECREASE PER THE SCHEDULE ALL ALL MASONRY OPENINGS, INCLUDING WHERE MASONRY LINTEL OCCURS BELOW.

FRAMING PLAN NOTES

1. TOP OF ROOF DECK AND TOP OF STRUCTURAL ELEVATION WILL VARY WITH THE ROOF SLOPE.
2. JOIST SEAT DEPTH SHALL BE SJI STANDARD FOR TYPE OF JOIST, U.N.O. SEAT DEPTH GIVEN IS TAKEN AT CENTERLINE OF GIRDER OR AT INSIDE FACE OF MASONRY.
3. JOIST MANUFACTURER TO DESIGN JOISTS FOR ADDITIONAL NET UPLIFT LOADS PER S003. PROVIDE BOTTOM CHORD JOIST BRACING PER 3/S503 AND 5/S503.
4. SIZE, LOCATION AND WEIGHT OF MECH UNIT SHALL BE CONFIRMED AND COORDINATED WITH MECH DWGS AND MECH CONTRACTOR/MANUFACTURER. WEIGHT OF UNIT (INCLUDING CURBS) SHALL NOT EXCEED THAT SHOWN ON THE PLAN. SEE 11/S503 FOR ADD'L FRAMING REQ'D AT MECH UNITS.
5. PROVIDE PRECAST LINTELS AT MASONRY OPENIGNS PER STRUCTURAL PLANS AND DETAILS. REFER TO ARCH FOR OPENING SIZE, LOCATION AND QUANTITY
6. REFER TO ARCH DWGS FOR EXPOSED STRUCTURE. SEE STRUCTURAL NOTES FOR ADD'L REQUIREMENTS AT THESE LOCATIONS.
7. U.N.O. JOIST SEAT DEPTHS SHALL BE STANDARD SJI SIZES 2 1/2" FOR K-SERIES, 5" FOR LH SERIES.

ROOF FRAMING KEY NOTES

1. 1 1/2" METAL ROOF DECK (GALVANIZED), SEE 7/S503.
2. ▶ INDICATES MOMENT CONNECTION.
3. TYPICAL TOP & BOTTOM CHORD CONTINUOUS BRIDGING BY JOIST MANUFACTURER. BRIDGING SHALL CONTINUE TO BOTH SIDES OF STEEL BEAMS PARALLEL TO STEEL JOISTS PER 5/S503, TYPICAL.
4. TYPICAL CONTINUOUS UPLIFT BRIDGING BY JOIST MANUFACTURER.
5. FUTURE MECHANICAL UNITS (2.0 KIPS EACH MAX), PERMISSIBLE IN HATCHED AREAS ON PLAN. JOIST MANUFACTURER TO DESIGN FOR ADDITIONAL LOAD AT APPLICABLE JOISTS.
6. JOIST MANUFACTURER TO DESIGN FOR ADDITIONAL +/- 2 KIP ALLOWABLE POINT LOAD AT X +/- 1'-0" ALONG STEEL JOIST.
7. PROVIDE STEEL FRAMING AT MECHANICAL UNITS PER 11/S503.
8. JOIST MANUFACTURER TO DESIGN FOR ADDITIONAL 200 PLF ALLOWABLE DEAD LOAD FOR X +/- 1'-0" ALONG STEEL JOIST. WHERE MEP UNIT DOES NOT ALIGN W/ JOIST, REF KEYNOTES 6 AND 7 FOR ALTERNATE DESIGN.
9. LOCATION OF BID ALTERNATE EXTENTS. PROVIDE DESIGNS/DETAILS INDICATED SHOULD THIS BE THE TERMINATION POINT FOR THE BUILDING.
10. IF ALTERNATE WALL (AS INDICATED IN KEYNOTE 9) IS SELECTED AS TERMINATION OF BUILDING, WALL IDENTIFIED BY THIS NOTE SHALL BE DELETED FROM SCOPE.
11. PRE-FABRICATED FABRIC CANOPY, BY CANOPY MANUFACTURER. REF ARCH FOR SPECIFICATIONS. OUTDOOR FURNISHINGS OR STRUCTURES SHALL NOT ATTACH TO OR BE SUPPORTED BY STRUCTURAL STEEL, TYP
12. EPIC TORUS 4 ROOF DECK, 18 GA., G90 - CURVED TO MATCH ARCHITECTURAL PROFILE. FASTENING PATTERN:
    DECK/DECK (SIDELAP): 1.5" FILLET WELDS AT 24" O.C. PER SPAN, TYP
    DECK/SUPPORT: 3/4" PUDDLE WELDS AT 24/3 PATTERN
13. PERMITTED AREA FOR MODEL AIRPLANE SUPPORTS. JOIST MANUFACTURER SHALL DESIGN JOISTS WITH TWO ADDITIONAL 300 LB POINT LOADS AT ANY LOCATION ALONG THE STEEL JOIST WITHIN HATCHED REGION. MODEL AIRPLANES SHALL NOT EXCEED 700 LB TOTAL WITHIN EACH HATCHED REGION.
14. STEP IN TIE BEAM. SEE PLAN FOR ELEVATIONS AND SCHEDULE FOR BEAM SIZE.
15. FREE-STANDING CANOPY IS A BID ALTERNATE.
16. AT PRE-FAB AWNINGS (DESIGN BY AWNING MANUFACTURER) PROVIDE 2 COURSE DEPTH OF FULLY GROUTED CMU CELLS EQUAL TO LENGTH OF AWNING PLUS 16" EACH SIDE. PROVIDE IN 2 LOCATIONS - AT TOP (TIE HANGER ATTACHMENT ELEVATION) AND BOTTOM (AWNING ATTACHMENT ELEVATION). REF ARCH DWGS FOR AWNING LOCATIONS AND SPECIFICATIONS.

THIS BUILDING IS CLASSIFIED AS A "THRESHOLD BUILDING" SPECIAL INSPECTION OF THE CONSTRUCTION IS REQUIRED BY THE STATE OF FLORIDA IN ACCORDANCE WITH CHAPTER 553 OF THE FLORIDA STATUTES. CONSTRUCTION SHALL BE INSPECTED IN ACCORDANCE WITH THE SPECIAL INSPECTION PLAN.

OKALOOSA COUNTY

FLY VPS

CI 9-2811-AP
Construction of Satellite Concourse 'C'

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MLM JOB # TYPE PROPERTY

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Revisions

No.	Date	Description

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Key Plan

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ENLARGED ROOF FRAMING PLAN - AREA 3

BID DOCUMENTS

Drawing No.:

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12/1/2020 9:04:33 AM

LINTEL SCHEDULE

MARK	TYPE	WIDTH	DEPTH	TOP BARS	BOTTOM BARS	REMARKS
L-1	8F24-1B/1T	8"	24"	(1) #5	(1) #5	PRESTRESSED CAST-CRETE
L-2	12F24-2B/2T	12"	24"	(2) #5	(2) #5	PRECAST CAST-CRETE

* REFER TO ARCHITECTURAL DRAWINGS/SPECS FOR AESTHETIC REQUIREMENTS OF LINTELS

TIE BEAM SCHEDULE

MARK	WIDTH	DEPTH	TOP BARS	BOTTOM BARS	TYP STIRRUPS	STIRRUPS OVER ALL MASONRY OPENINGS*
TB-1	8"	20"	(2) #6	(2) #8	#3 @ 16" OC	#3 @ 6" OC
TB-2A	12"	17 1/2"	(2) #8	(3) #8	#3 @ 16" OC	#3 @ 6" OC
TB-2B	12"	20"	(2) #8	(3) #8	#3 @ 16" OC	#3 @ 6" OC
TB-3	12"	20"	(2) #5	(2) #5	#3 @ 16" OC	#3 @ 6" OC
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*TIE BEAM STIRRUP SPACING SHALL DECREASE PER THE SCHEDULE ALL ALL MASONRY OPENINGS, INCLUDING WHERE MASONRY LINTEL OCCURS BELOW.

FRAMING PLAN NOTES

1. TOP OF ROOF DECK AND TOP OF STRUCTURAL ELEVATION WILL VARY WITH THE ROOF SLOPE.
2. JOSIT SEAT DEPTH SHALL BE SJI STANDARD FOR TYPE OF JOIST, U.N.O. SEAT DEPTH GIVEN IS TAKEN AT CENTERLINE OF GIRDER OR AT INSIDE FACE OF MASONRY.
3. JOIST MANUFACTURER TO DESIGN JOISTS FOR ADDITIONAL NET UPLIFT LOADS PER S003. PROVIDE BOTTOM CHORD JOIST BRACING PER 3/S503 AND S/S503.
4. SIZE, LOCATION AND WEIGHT OF MECH UNIT SHALL BE CONFIRMED AND COORDINATED WITH MECH DWGS AND MECH CONTRACTOR/MANUFACTURER. WEIGHT OF UNIT (INCLUDING CURBS) SHALL NOT EXCEED THAT SHOWN ON THE PLAN. SEE 11/S503 FOR ADD'L FRAMING REQ'D AT MECH UNITS.
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6. REFER TO ARCH DWGS FOR EXPOSED STRUCTURE. SEE STRUCTURAL NOTES FOR ADD'L REQUIREMENTS AT THESE LOCATIONS.
7. U.N.O. JOIST SEAT DEPTHS SHALL BE STANDARD SJI SIZES 2 1/2" FOR K-SERIES, 5" FOR LH SERIES.

ROOF FRAMING KEY NOTES

1. 1 1/2" METAL ROOF DECK (GALVANIZED), SEE 7/S503.
2. ▶ INDICATES MOMENT CONNECTION.
3. TYPICAL TOP & BOTTOM CHORD CONTINUOUS BRIDGING BY JOIST MANUFACTURER. BRIDGING SHALL CONTINUE TO BOTH SIDES OF STEEL BEAMS PARALLEL TO STEEL JOISTS PER S/S503, TYPICAL.
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8. JOIST MANUFACTURER TO DESIGN FOR ADDITIONAL 200 PLF ALLOWABLE DEAD LOAD FOR X +/- 1'-0" ALONG STEEL JOIST. WHERE MEP UNIT DOES NOT ALIGN W/ JOIST, REF KEYNOTES 6 AND 7 FOR ALTERNATE DESIGN.
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12. EPIC TORUS 4 ROOF DECK, 18 GA., G90 - CURVED TO MATCH ARCHITECTURAL PROFILE. FASTENING PATTERN: DECK/DECK (SIDELAP): 1.5" FILLET WELDS AT 24" O.C. PER SPAN, TYP DECK/SUPPORT: 3/4" PUDDLE WELDS AT 24/3 PATTERN
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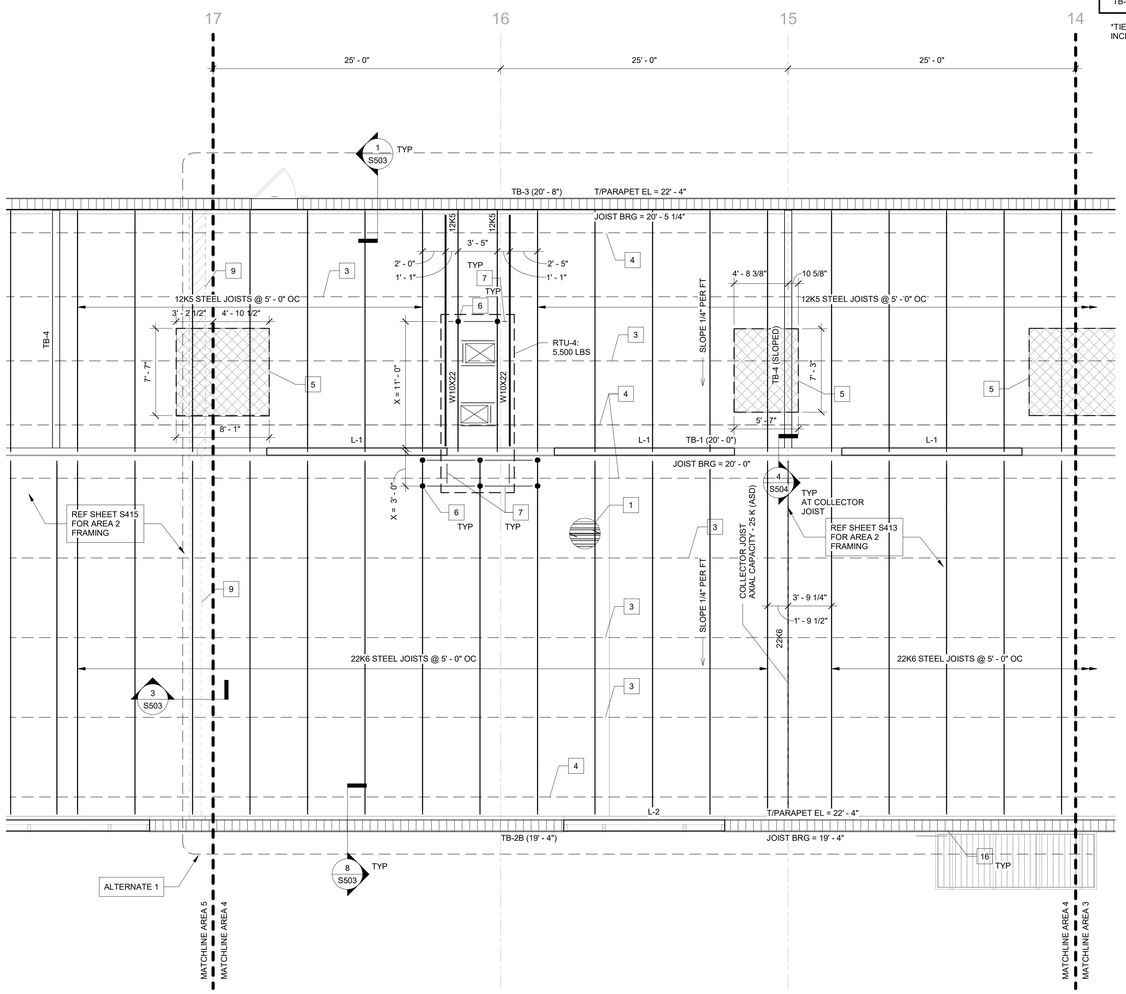

1 S414 ROOF FRAMING PLAN -AREA 4

3/16" = 1'-0"

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OKALOOSA COUNTY

FLY VPS

CI 9-2811-AP
Construction of Satellite Concourse 'C'

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MLM JOB # TYPE PROPERTY

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Seal

SEAL

Revisions

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ENLARGED ROOF FRAMING PLAN - AREA 4

BID DOCUMENTS

Drawing No.:

S414

BIM 360://Design of Satellite Concourse/VPS-MLM-S.rvt
12/1/2020 9:04:34 AM

LINTEL SCHEDULE

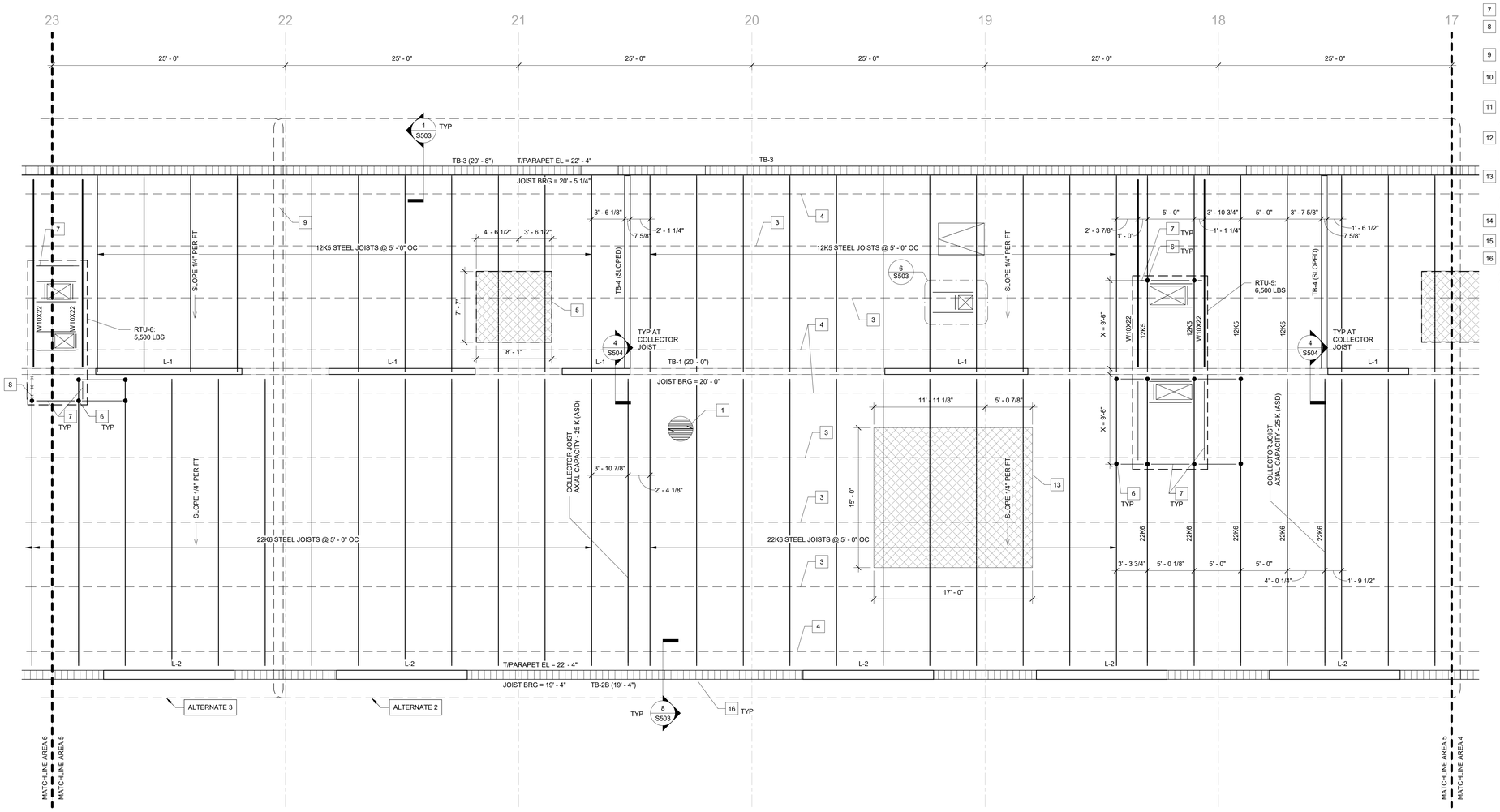
MARK	TYPE	WIDTH	DEPTH	TOP BARS	BOTTOM BARS	REMARKS
L-1	8F24-1B/1T	8"	24"	(1) #5	(1) #5	PRESTRESSED CAST-CRETE
L-2	12F24-2B/2T	12"	24"	(2) #5	(2) #5	PRECAST CAST-CRETE

* REFER TO ARCHITECTURAL DRAWINGS/SPECS FOR AESTHETIC REQUIREMENTS OF LINTELS

TIE BEAM SCHEDULE

MARK	WIDTH	DEPTH	TOP BARS	BOTTOM BARS	TYP STIRRUPS	STIRRUPS OVER ALL MASONRY OPENINGS*
TB-1	8"	20"	(2) #6	(2) #8	#3 @ 16" OC	#3 @ 6" OC
TB-2A	12"	17 1/2"	(2) #8	(3) #8	#3 @ 16" OC	#3 @ 6" OC
TB-2B	12"	20"	(2) #8	(3) #8	#3 @ 16" OC	#3 @ 6" OC
TB-3	12"	20"	(2) #5	(2) #5	#3 @ 16" OC	#3 @ 6" OC
TB-4	8"	20"	(2) #5	(2) #5	#3 @ 16" OC	#3 @ 6" OC

*TIE BEAM STIRRUP SPACING SHALL DECREASE PER THE SCHEDULE ALL ALL MASONRY OPENINGS, INCLUDING WHERE MASONRY LINTEL OCCURS BELOW.



1 S415 ROOF FRAMING PLAN -AREA 5

3/16" = 1'-0"

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FRAMING PLAN NOTES

1. TOP OF ROOF DECK AND TOP OF STRUCTURAL ELEVATION WILL VARY WITH THE ROOF SLOPE.
2. JOIST SEAT DEPTH SHALL BE SJI STANDARD FOR TYPE OF JOIST, U.N.O. SEAT DEPTH GIVEN IS TAKEN AT CENTERLINE OF GIRDER OR AT INSIDE FACE OF MASONRY.
3. JOIST MANUFACTURER TO DESIGN JOISTS FOR ADDITIONAL NET UPLIFT LOADS PER S003. PROVIDE BOTTOM CHORD JOIST BRACING PER 3/S503 AND 5/S503.
4. SIZE, LOCATION AND WEIGHT OF MECH UNIT SHALL BE CONFIRMED AND COORDINATED WITH MECH DWGS AND MECH CONTRACTOR/MANUFACTURER. WEIGHT OF UNIT (INCLUDING CURBS) SHALL NOT EXCEED THAT SHOWN ON THE PLAN. SEE 11/S503 FOR ADD'L FRAMING REQ'D AT MECH UNITS.
5. PROVIDE PRECAST LINTELS AT MASONRY OPENIGNS PER STRUCTURAL PLANS AND DETAILS. REFER TO ARCH FOR OPENING SIZE, LOCATION AND QUANTITY
6. REFER TO ARCH DWGS FOR EXPOSED STRUCTURE. SEE STRUCTURAL NOTES FOR ADD'L REQUIREMENTS AT THESE LOCATIONS.
7. U.N.O. JOIST SEAT DEPTHS SHALL BE STANDARD SJI SIZES 2 1/2" FOR K-SERIES, 5" FOR LH SERIES.

ROOF FRAMING KEY NOTES

1. 1 1/2" METAL ROOF DECK (GALVANIZED), SEE 7/S503.
2. ▶ INDICATES MOMENT CONNECTION.
3. TYPICAL TOP & BOTTOM CHORD CONTINUOUS BRIDGING BY JOIST MANUFACTURER. BRIDGING SHALL CONTINUE TO BOTH SIDES OF STEEL BEAMS PARALLEL TO STEEL JOISTS PER 5/S503, TYPICAL.
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5. FUTURE MECHANICAL UNITS (2.0 KIPS EACH MAX), PERMISSIBLE IN HATCHED AREAS ON PLAN. JOIST MANUFACTURER TO DESIGN FOR ADDITIONAL LOAD AT APPLICABLE JOISTS.
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MLM JOB # TYPE PROPERTY

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Revisions

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MARK	TYPE	WIDTH	DEPTH	TOP BARS	BOTTOM BARS	REMARKS
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TIE BEAM SCHEDULE

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1. 1 1/2" METAL ROOF DECK (GALVANIZED), SEE 7/S503.
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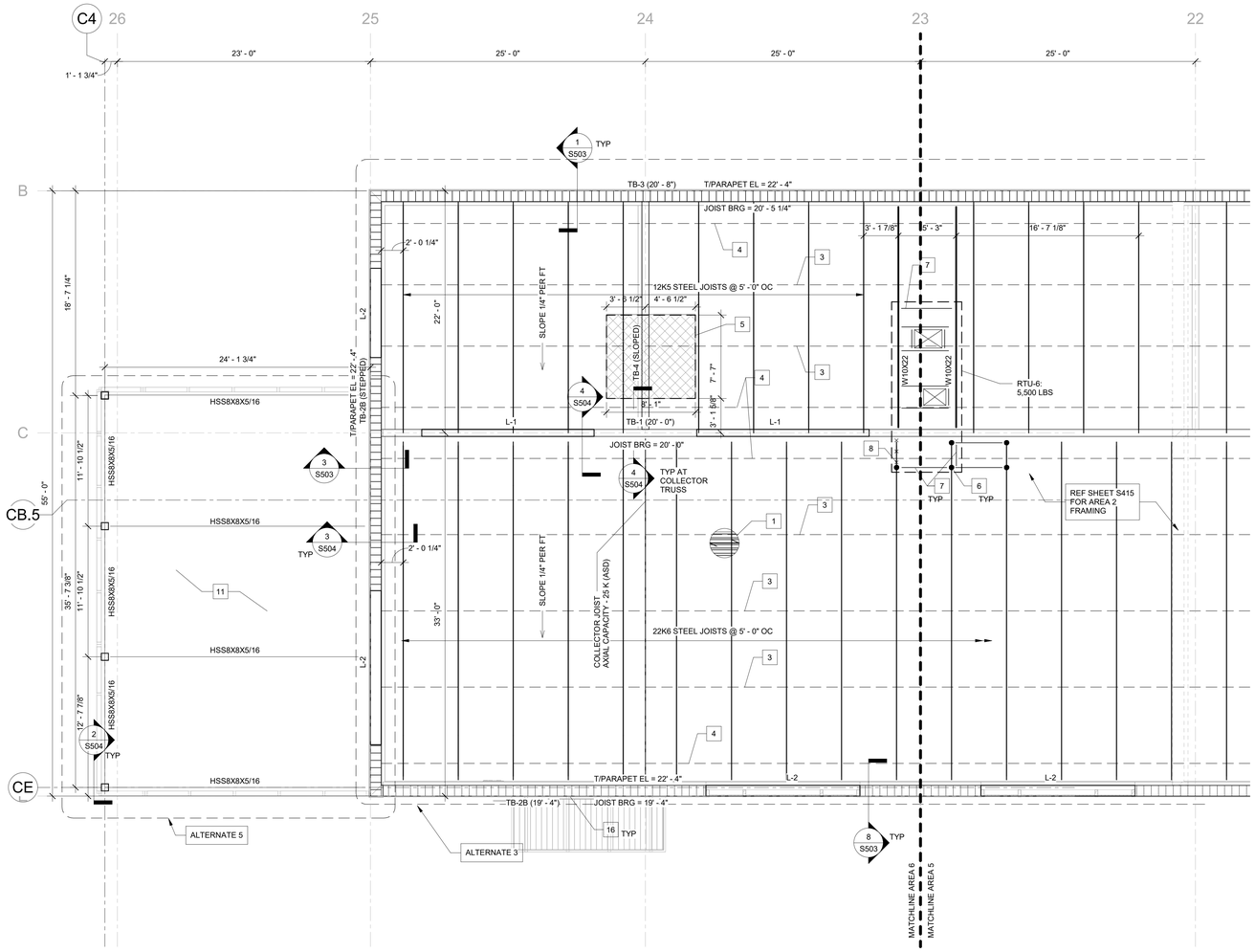
3. TYPICAL TOP & BOTTOM CHORD CONTINUOUS BRIDGING BY JOIST MANUFACTURER. BRIDGING SHALL CONTINUE TO BOTH SIDES OF STEEL BEAMS PARALLEL TO STEEL JOISTS PER 5/S503, TYPICAL.
4. TYPICAL CONTINUOUS UPLIFT BRIDGING BY JOIST MANUFACTURER.
5. FUTURE MECHANICAL UNITS (2.0 KIPS EACH MAX), PERMISSIBLE IN HATCHED AREAS ON PLAN. JOIST MANUFACTURER TO DESIGN FOR ADDITIONAL LOAD AT APPLICABLE JOISTS.
6. JOIST MANUFACTURER TO DESIGN FOR ADDITIONAL +/- 2 KIP ALLOWABLE POINT LOAD AT X +/- 1'-0" ALONG STEEL JOIST.
7. PROVIDE STEEL FRAMING AT MECHANICAL UNITS PER 11/S503.
8. JOIST MANUFACTURER TO DESIGN FOR ADDITIONAL 200 PLF ALLOWABLE DEAD LOAD FOR X +/- 1'-0" ALONG STEEL JOIST. WHERE MEP UNIT DOES NOT ALIGN W/ JOIST, REF KEYNOTES 6 AND 7 FOR ALTERNATE DESIGN.
9. LOCATION OF BID ALTERNATE EXTENTS. PROVIDE DESIGNS/DETAILS INDICATED SHOULD THIS BE THE TERMINATION POINT FOR THE BUILDING.
10. IF ALTERNATE WALL (AS INDICATED IN KEYNOTE 9) IS SELECTED AS TERMINATION OF BUILDING, WALL IDENTIFIED BY THIS NOTE SHALL BE DELETED FROM SCOPE.
11. PRE-FABRICATED FABRIC CANOPY, BY CANOPY MANUFACTURER. REF ARCH FOR SPECIFICATIONS. OUTDOOR FURNISHINGS OR STRUCTURES SHALL NOT ATTACH TO OR BE SUPPORTED BY STRUCTURAL STEEL, TYP
12. EPIC TORUS 4 ROOF DECK, 18 GA., G90 - CURVED TO MATCH ARCHITECTURAL PROFILE. FASTENING PATTERN:
    DECK/DECK (SIDELAP): 1.5" FILLET WELDS AT 24" O.C. PER SPAN, TYP
    DECK/SUPPORT: 3/4" PUDDLE WELDS AT 24/3 PATTERN
13. PERMITTED AREA FOR MODEL AIRPLANE SUPPORTS. JOIST MANUFACTURER SHALL DESIGN JOISTS WITH TWO ADDITIONAL 300 LB POINT LOADS AT ANY LOCATION ALONG THE STEEL JOIST WITHIN HATCHED REGION. MODEL AIRPLANES SHALL NOT EXCEED 700 LB TOTAL WITHIN EACH HATCHED REGION.
14. STEP IN TIE BEAM. SEE PLAN FOR ELEVATIONS AND SCHEDULE FOR BEAM SIZE.
15. FREE-STANDING CANOPY IS A BID ALTERNATE.
16. AT PRE-FAB AWNINGS (DESIGN BY AWNING MANUFACTURER) PROVIDE 2 COURSE DEPTH OF FULLY GROUTED CMU CELLS EQUAL TO LENGTH OF AWNING PLUS 16" EACH SIDE. PROVIDE IN 2 LOCATIONS - AT TOP (TIE HANGER ATTACHMENT ELEVATION) AND BOTTOM (AWNING ATTACHMENT ELEVATION). REF ARCH DWGS FOR AWNING LOCATIONS AND SPECIFICATIONS.



1 S416 ROOF FRAMING PLAN -AREA 6

3/16" = 1'-0"

THIS BUILDING IS CLASSIFIED AS A "THRESHOLD BUILDING" SPECIAL INSPECTION OF THE CONSTRUCTION IS REQUIRED BY THE STATE OF FLORIDA IN ACCORDANCE WITH CHAPTER 553 OF THE FLORIDA STATUTES. CONSTRUCTION SHALL BE INSPECTED IN ACCORDANCE WITH THE SPECIAL INSPECTION PLAN.

OKALOOSA COUNTY

FLY VPS

CI 9-2811-AP
Construction of Satellite Concourse 'C'

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Revisions

No.	Date	Description

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TLC No.:719055
THINK. LISTEN. CREATE.

Key Plan

Project No.:	MLM-19672
Designed By:	JFS
Drawn By:	SVW
Checked By:	JFS
Issue Date:	30-NOV-2020
Drawing Scale:	As indicated

Drawing Title:

ENLARGED ROOF FRAMING PLAN - AREA 6

BID DOCUMENTS

Drawing No.:

S416

BIM 360://Design of Satellite Concourse/VPS-MLM-S.rvt

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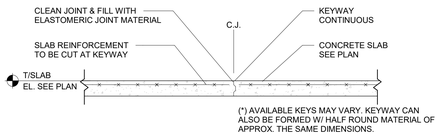
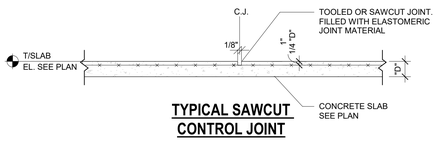


TYPICAL CONSTRUCTION JOINT



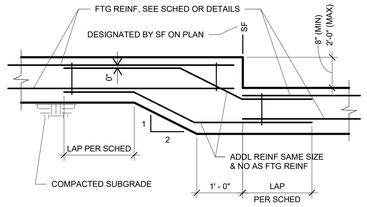
TYPICAL SAWCUT CONTROL JOINT

NOTE:

1. C.J. INDICATES CONTROL OR CONSTRUCTION JOINT.
2. CONTROL JOINTS SHALL BE SAWCUT AS SOON AS POSSIBLE WITHOUT RAVELING CONCRETE (4 TO 16 HOURS AFTER PLACEMENT MAX.).
3. JOINT PLACEMENT REQUIREMENTS:
   FOR ENCLOSED/INTERIOR AREAS. 15'-0" O.C. (MAX.) EACH WAY
   FOR OUTSIDE/EXTERIOR AREAS. 12'-0" O.C. (MAX.) EACH WAY
   WHERE TOP OF SLAB SURFACES ARE TO BE FINISHED WITH TILE, GENERAL CONTRACTOR IS TO COORDINATE JOINT LOCATIONS WITH THAT OF MORTAR JOINTS.

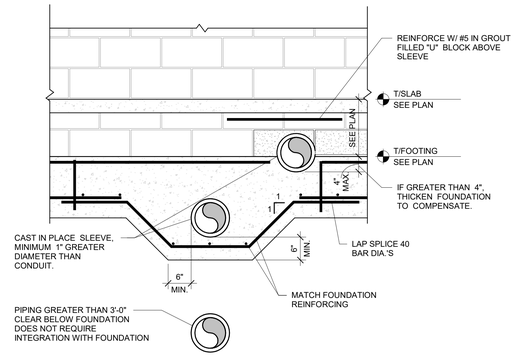
1 S501 TYPICAL SLAB CONSTRUCTION/CONTROL JOINTS

3/4" = 1'-0"



2 S501 TYP STEPPED FTG DETAIL

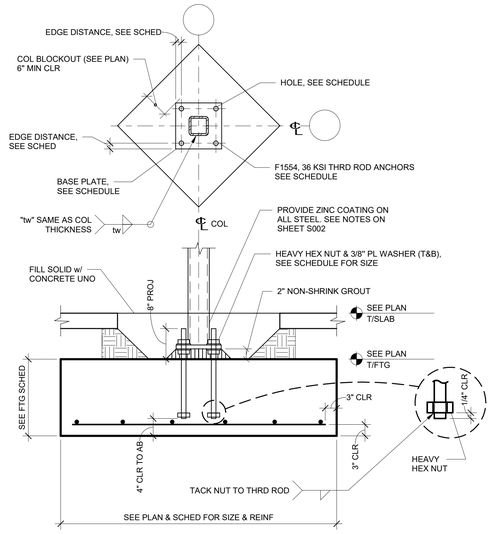
3/4" = 1'-0"



3 S501 TYPICAL FOUNDATION CONDUIT SLEEVE

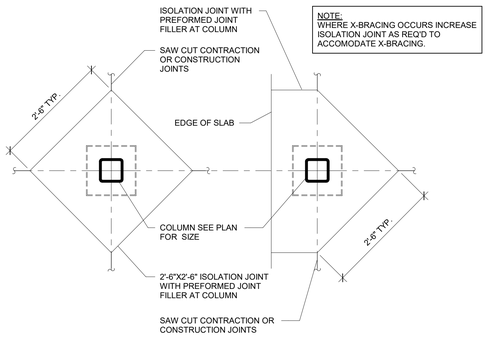
3/4" = 1'-0"

BASE PLATE SCHEDULE					
COLUMN	BASE PLATE	ANCHORS	HOLE DIAMETER	MIN WASHER DIAMETER	ANCHOR ROD EDGE DISTANCE
HSS 5x5, HSS-6x6	PL 1"x12"x12"	(4) 3/4"Ø	1 5/16"	1 7/8"	1 1/2"
HSS-8x8	PL 1 1/4"x16"x16"	(4) 1"Ø	1 13/16"	2 5/8"	2"



4 S501 HSS COLUMN/FTG DETAIL

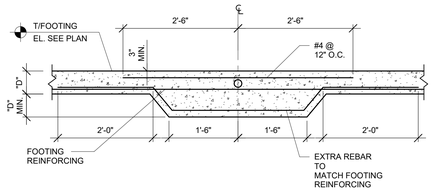
3/4" = 1'-0"



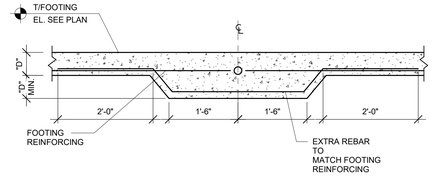
NOTE:
WHERE X-BRACING OCCURS INCREASE ISOLATION JOINT AS REQ'D TO ACCOMODATE X-BRACING.

6 S501 TYP. S.O.G. JOINT DETAILS @ COLUMNS

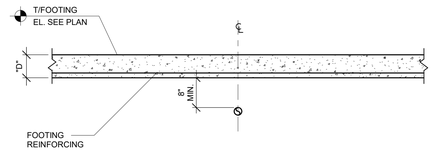
3/4" = 1'-0"



PIPE NEAR TOP OF FOOTING



PIPE AT BOTTOM OF FOOTING

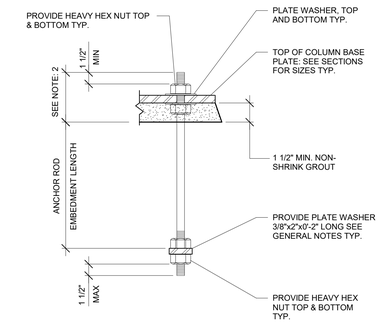


PIPE UNDER FOOTING

NOTES:
1. VERIFY PIPE PENETRATION LOCATIONS WITH PLUMBING DRAWINGS.
2. "D" EQUALS WALL FOOTING THICKNESS SEE X/SXXX.

7 S501 HVAC PIPES NEAR FOOTINGS

3/4" = 1'-0"

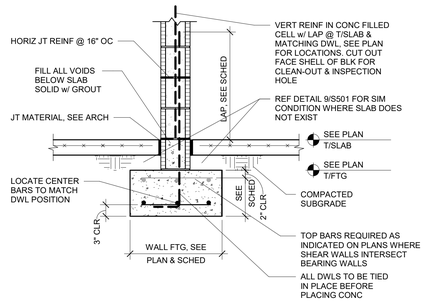


ANCHOR ROD NOTES:

1. THE INFORMATION SHOWN IN THIS DETAIL IS FOR USE WITH ANCHOR RODS-3/4"Ø AND LARGER.
2. ANCHOR ROD PROJECTION: MINIMUM LENGTH AS REQUIRED TO ACCOUNT FOR NON-SHRINK GROUT, COLUMN BASE PLATE THICKNESS, WASHERS/NUT, PLUS 1 1/2" MIN. (THREADED LENGTH ABOVE NUT)
3. HOLES IN THE PLATE WASHERS SHALL BE SIZED 1/16" OVER THAT OF THE ANCHOR ROD DIAMETER.
4. ALL ANCHOR ROD NUTS SHALL BE "SNUG TIGHTENED" AS DEFINED BY "AISC" AFTER THE FOOTING CONCRETE HAS A MINIMUM OF 14 (FOURTEEN) DAYS TO CURE. (TYP. UNLESS NOTED OTHERWISE)

5 S501 TYPICAL ANCHOR ROD DETAIL

3/4" = 1'-0"



10 S501 INT BLOCK WALL AT FTG

3/4" = 1'-0"

NOTE:
TOP REINFORCING NOT REQ'D IF BOTTOM OF FOOTINGS ARE AT THE SAME ELEVATION.

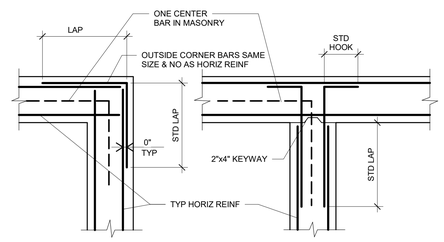
12 S501 COMBINED FOOTING

3/4" = 1'-0"

BAR SPLICE SCHEDULE							
TOP BARS SPLICE SCHEDULE				OTHER BARS SPLICE SCHEDULE			
TOP BARS	CONCRETE STRENGTH IN PSI			OTHER BARS	CONCRETE STRENGTH IN PSI		
BAR SIZE	3000	4000	5000	BAR SIZE	3000	4000	5000
#3	28	24	22	3	21	18	17
#4	37	32	29	4	28	25	22
#5	46	40	36	5	36	31	28
#6	56	48	43	6	43	37	33
#7	81	70	63	7	62	54	48
#8	93	80	72	8	71	62	55

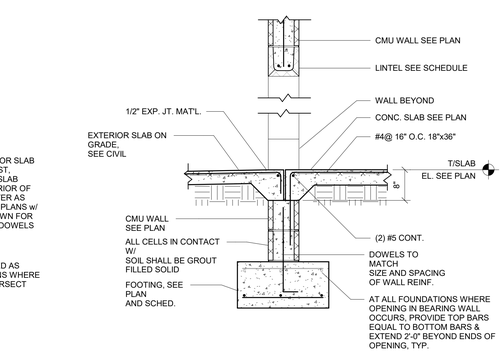
13 S501 BAR SPLICE SCHEDULE

3/4" = 1'-0"



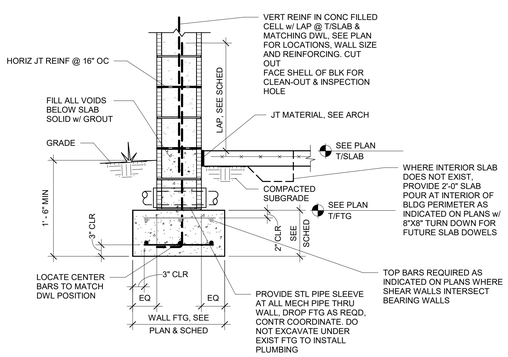
8 S501 TYP HORIZ REINF IN BEAMS, WALLS AND FTGS

3/4" = 1'-0"



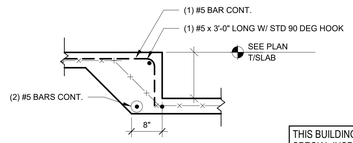
11 S501 TYP. CMU STEM WALL FOOTING @ OPENING

3/4" = 1'-0"



9 S501 EXT BLOCK WALL AT FTG

3/4" = 1'-0"



14 S501 RAMP EDGE DETAIL

3/4" = 1'-0"

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OKALOOSA COUNTY

FLY VPS

CI 9-2811-AP
Construction of Satellite Concourse 'C'

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MLM JOB #: TYPE PROPERTY

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Revisions

No.	Date	Description

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TLC No.:719055
THINK. LISTEN. CREATE.

Key Plan

Project No.:	MLM-19672
Designed By:	JFS
Drawn By:	SVW
Checked By:	JFS
Issue Date:	30-NOV-2020
Drawing Scale:	3/4" = 1'-0"

Drawing Title:

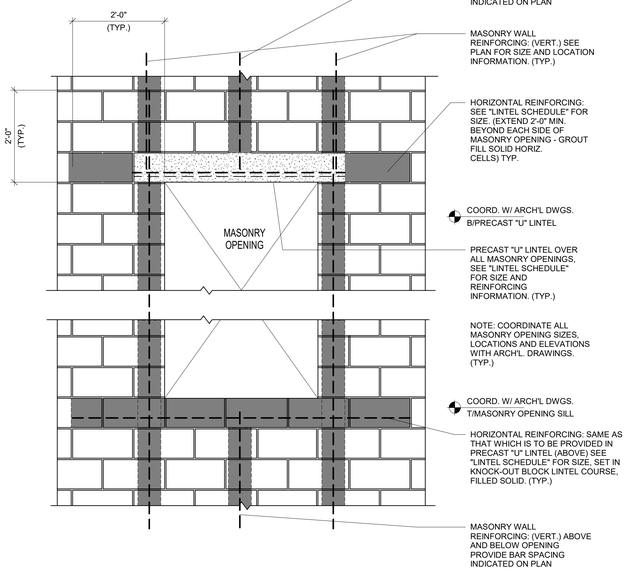
FOUNDATION SECTIONS AND DETAILS

BID DOCUMENTS

Drawing No.:

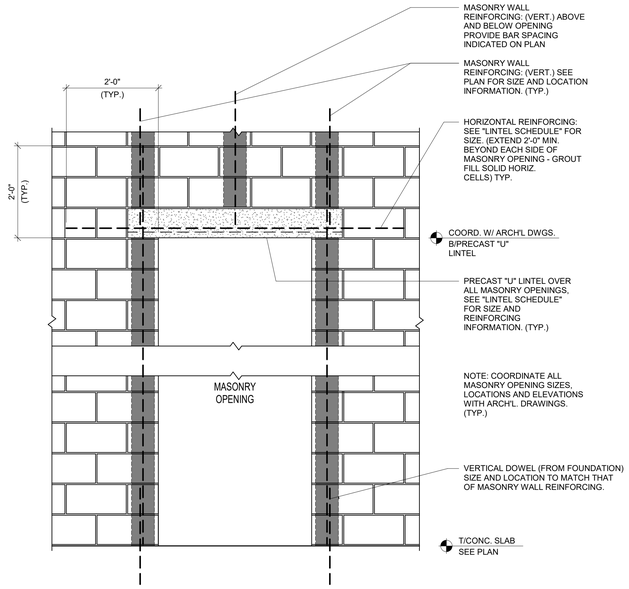
S501

BIM 360://Design of Satellite Concourse/VPS-MLM-S.rvt
12/1/2020 9:04:39 AM



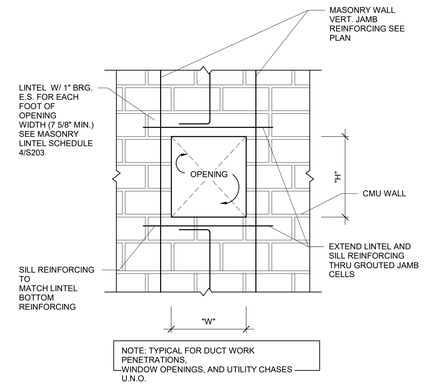
1 S502 TYP. REINFORCING @ LARGE MASONRY OPENINGS

3/4" = 1'-0"



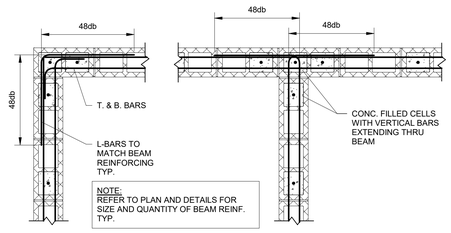
2 S502 TYP. REINFORCING @ MASONRY DOOR OPENINGS

3/4" = 1'-0"



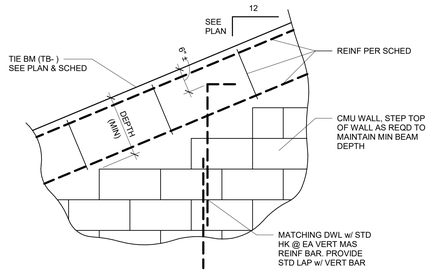
3 S502 TYP. REINFORCING AT SMALL MASONRY OPENINGS

3/4" = 1'-0"



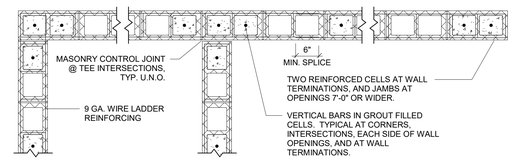
4 S502 TYPICAL BOND BEAM AND CORNER REINFORCING

3/4" = 1'-0"



10 S502 TYP SLOPING TIE BEAM DETAIL

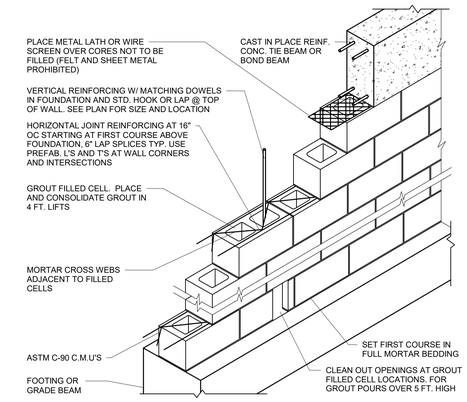
3/4" = 1'-0"



NOTES:
1. TYPICAL WIRE LADDER REINFORCEMENT FOR ALL C.M.U. WALLS SPACED @ 16" O.C. VERTICALLY. PROVIDE ADDITIONAL LAYERS ABOVE AND BELOW WINDOW AND DOOR OPENINGS
2. SEE PLAN FOR SIZE AND SPACING OF VERT. REINF. BARS.
3. USE PREFABRICATED L-SHAPED WIRE SEGMENTS AT WALL INTERSECTIONS.
4. TERMINATE HORZ. WIRE REINFORCING AT CONTROL JOINTS

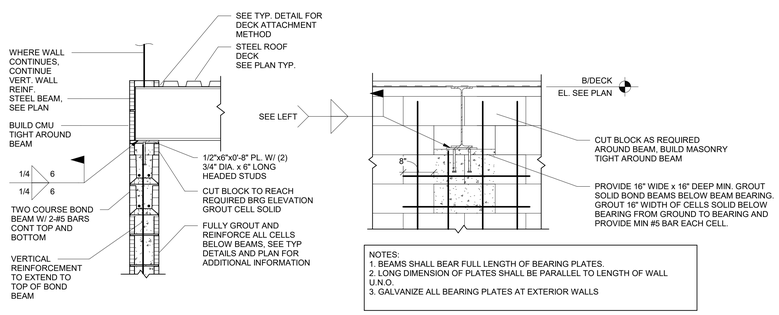
5 S502 TYPICAL HORIZ. WALL REINF'G / VERT. CORNER REIN'G

3/4" = 1'-0"



6 S502 TYP. MASONRY WALL CONSTRUCTION

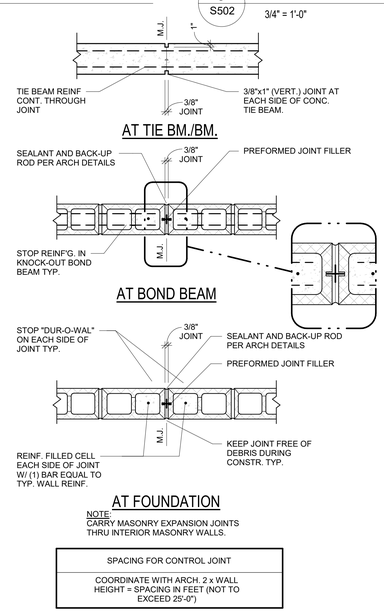
3/4" = 1'-0"



NOTES:
1. BEAMS SHALL BEAR FULL LENGTH OF BEARING PLATES.
2. LONG DIMENSION OF PLATES SHALL BE PARALLEL TO LENGTH OF WALL U.N.O.
3. GALVANIZE ALL BEARING PLATES AT EXTERIOR WALLS

7 S502 TYP. SECTION STEEL BEAM BRG ON CMU WALL

3/4" = 1'-0"

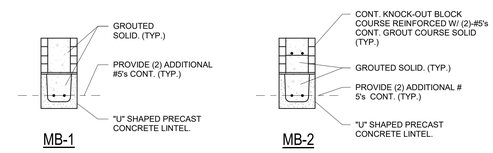


NOTE:
CARRY MASONRY EXPANSION JOINTS THRU INTERIOR MASONRY WALLS.

SPACING FOR CONTROL JOINT
COORDINATE WITH ARCH. 2 x WALL HEIGHT = SPACING IN FEET (NOT TO EXCEED 25'-0")

8 S502 TYPICAL MASONRY JOINT DETAILS

3/4" = 1'-0"



NOTE:
SHORE PRECAST "U" LINTELS PER MANUFACTURERS RECOMMENDATIONS

MASONRY LINTEL SCHEDULE (CAST-CRETE LINTEL)

MARK	LENGTH (L)	CAST-CRETE MARK	REMARK
MB-1	L ≤ 4-0"	8F8-1B/0T PRECAST	SEE NOTE 4
MB-2	4' -0"< L ≤ 8'-0"	8F16-1B/1T PRECAST	SEE NOTE 4
MB-3	L ≤ 4-0"	12F9-2B/0T PRECAST	SEE NOTE 4
MB-4	4' -0"< L ≤ 8'-0"	12F16-2B/2T PRECAST	SEE NOTE 4

1. PROVIDE MASONRY LINTEL OVER ALL OPENINGS SHOWN ON THE ARCH, MECH, AND ELEC DWGs. IF NO LINTEL IS SPECIFIED, PROVIDE LINTEL PER SCHEDULE ABOVE.
2. PROVIDE MINIMUM END BEARING OF 8". CUT OUT BOTTOM OF LINTEL AT END TO ALLOW CONTINUATION OF FILLED CELL REINFORCING.
3. MASONRY LINTEL SUBSTITUTIONS MUST BE APPROVED BY THE STRUCTURAL ENGINEER OF RECORD PRIOR TO INSTALLATION.
4. SCHEDULED LINTELS ASSUME MASONRY ARCHING ACTION. THE FOLLOWING MUST BE MET:
   a. 5'-8" OR MORE WALL HEIGHT MUST OCCUR ABOVE OPENING.
   b. CONTROL JOINTS MUST NOT OCCUR ADJACENT TO LINTEL.
   c. OPENINGS MUST BE 4'-0" OR MORE FROM THE END OF WALL.
5. THIS SCHEDULE APPLIES FOR MASONRY OPENINGS REQUIRED BY SOFFITS OR RECESSED DOOR/WATER FOUNTAIN OPENINGS SHOWN ON ARCHITECTURAL DRAWINGS UNLESS SHOWN ON THE STRUCTURAL DRAWINGS.

9 S502 MASONRY LINTEL SCHEDULE

3/4" = 1'-0"

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Revisions

No.	Date	Description

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Key Plan

Project No.:	MLM-19672
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MASONRY SECTIONS AND DETAILS

BID DOCUMENTS

Drawing No.:

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BIM 360://Design of Satellite Concourse/VPS-MLM-S.rvt
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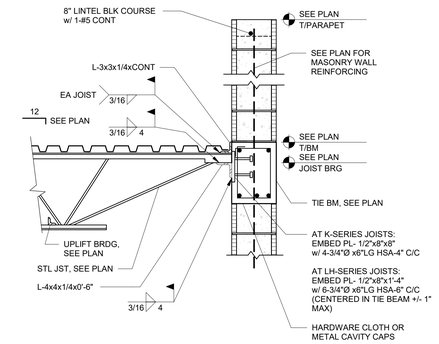
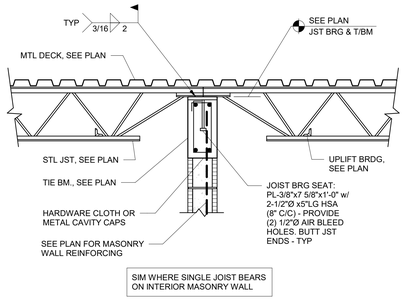


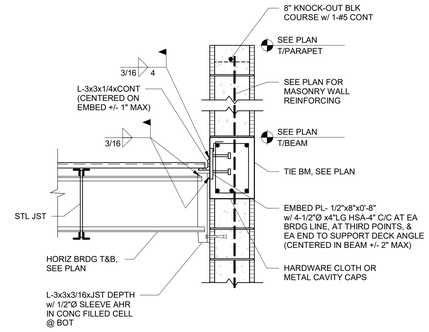
1 S503 JOIST BRG AT EXTERIOR

3/4" = 1'-0"



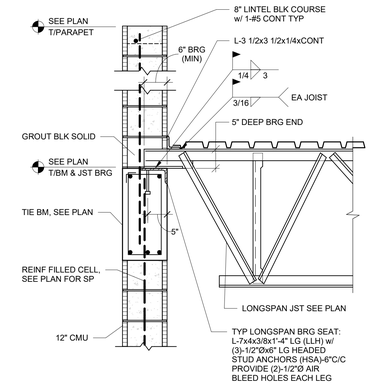
2 S503 COMMON JOIST BRG AT TIE BEAM

3/4" = 1'-0"



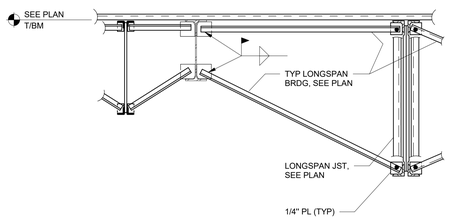
3 S503 JOIST BRIDGING AT EXTERIOR

3/4" = 1'-0"



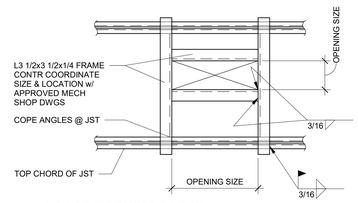
4 S503 LONGSPAN JOIST BEARING

3/4" = 1'-0"



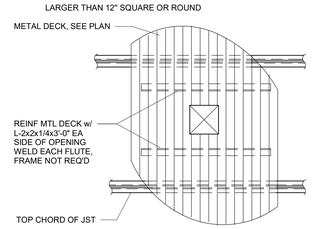
5 S503 TYPICAL JOIST BRIDGING CONN

3/4" = 1'-0"



LARGE OPENING DETAIL

LARGER THAN 12" SQUARE OR ROUND

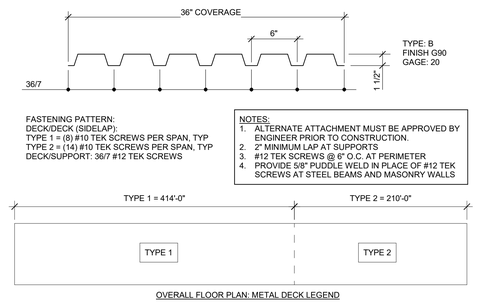


SMALL OPENING DETAIL

SMALLER THAN 12" SQ. & LARGER THAN 6" SQ.

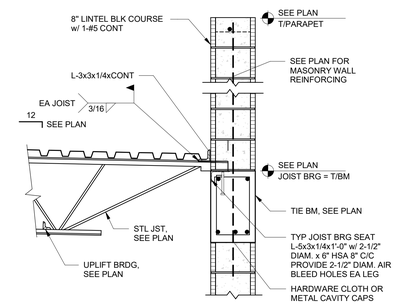
6 S503 ROOF OPENING DETAIL

3/4" = 1'-0"



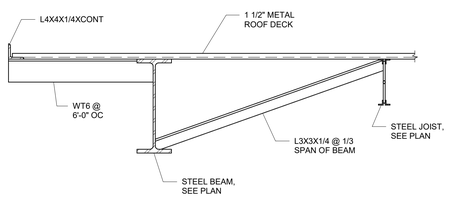
7 S503 TYP. ROOF DECK ATTACHMENT DETAIL

3/4" = 1'-0"



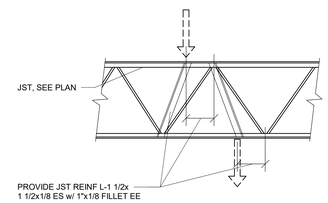
8 S503 JOIST BRG AT EXTERIOR

3/4" = 1'-0"



9 S503 JOIST BRIDGING AT EXT STEEL BEAM

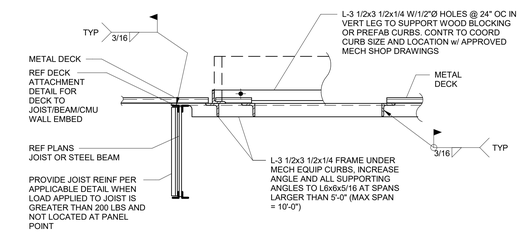
3/4" = 1'-0"



CONCENTRATED LOADS MORE THAN 100 LBS REQUIRE REINFORCEMENT PER THIS DETAIL WHEN NOT APPLIED AT JOIST PANEL POINTS. LOADS EXCEEDING 400 LBS AND NOT NOTED ON STRUCTURAL PLANS MUST BE BROUGHT TO THE ATTENTION OF THE STRUCTURAL ENGINEER FOR APPROVAL PRIOR TO SUPPORT.

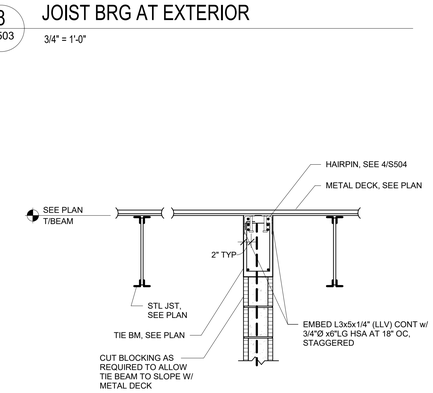
10 S503 JOIST REINFORCEMENT DETAIL

3/4" = 1'-0"



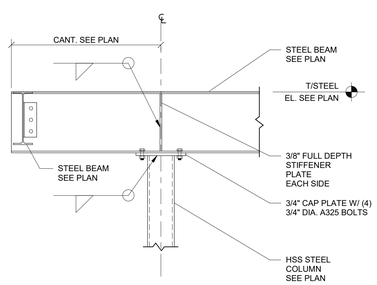
11 S503 MECH UNIT SUPPORT DETAIL

3/4" = 1'-0"



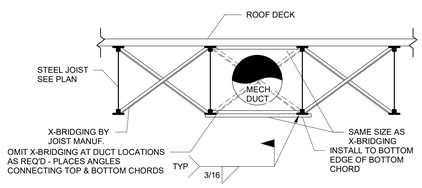
12 S503 DECK SUPPORT AT CONCRETE BEAM

3/4" = 1'-0"



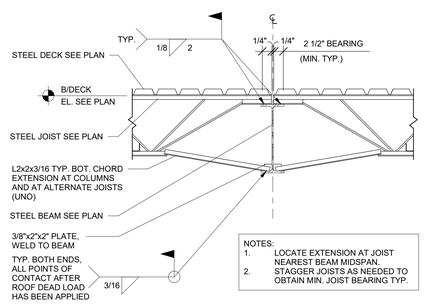
13 S503 SECTION @ CANT. BEAM TO COLUMN CONN.

3/4" = 1'-0"



14 S503 JOIST X-BRIDGING MODIFICATION @ MECH. DUCT LOCATIONS

3/4" = 1'-0"



15 S503 TYP. SECTION @ JOISTS ON INT. BEAM

3/4" = 1'-0"

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OKALOOSA COUNTY

FLY VPS

CI 9-2811-AP
Construction of Satellite Concourse 'C'

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WWW.MLM-MARTIN.COM
AA-C002208
MLM JOB #/ TYPE PROPERTY

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Seal

SEAL

Revisions

No.	Date	Description

TLC ENGINEERING SOLUTIONS
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P 407 841 9050
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COA 15
www.tlc-engineers.com
TLC No.:719055
THINK. LISTEN. CREATE.

Key Plan

Project No.:	MLM-19672
Designed By:	JFS
Drawn By:	SVW
Checked By:	JFS
Issue Date:	30-NOV-2020
Drawing Scale:	3/4" = 1'-0"

Drawing Title:

SECTIONS AND DETAILS

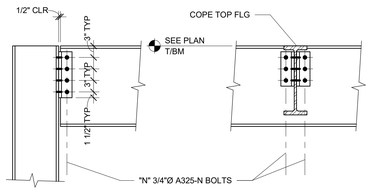
BID DOCUMENTS

Drawing No.:

S503

BIM 360://Design of Satellite Concourse/VPS-MLM-S.rvt

12/1/2020 9:04:44 AM

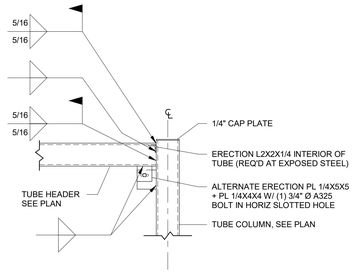


BEAM TO COLUMN **BEAM TO BEAM**

BEAM TO BEAM OR BEAM TO COLUMN SHEAR CONNECTIONS		
BEAM	ANGLE SIZE	"N" BOLTS EA LEG
W8-W12	(2) L-3 1/2"x3 1/2"x5/16"x0'-6"	(2) 3/4"Ø A325-N
W16	(2) L-3 1/2"x3 1/2"x5/16"x0'-9"	(3) 3/4"Ø A325-N

1 S504 BEAM TO COL & BEAM TO BEAM CONN

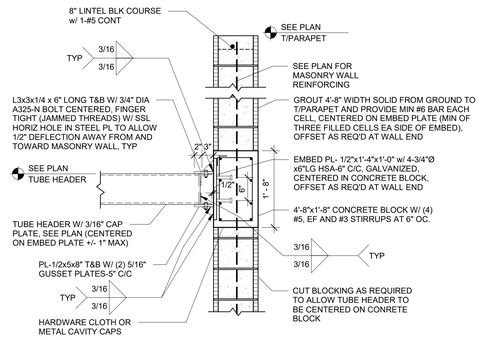
3/4" = 1'-0"



NOTES:
1. FIELD WELD SHALL BE MADE PRIOR TO APPLICATION OF ROOF OR WALL DEAD LOAD.
2. REMOVE ERECTION PLATES AFTER COMPLETION OF FIELD WELD
3. WHERE BEAM WIDTH MATCHES COLUMN WIDTH COPE BEAM AROUND COLUMN CORNERS TO FIT COLUMN SHAPE.
4. WHERE BEAM WIDTH IS NARROWER THAN COLUMN FACE PROVIDE FILLET WELD ALL AROUND.
5. WELD AT ERECTION PLATES TO BE DETERMINED BY FABRICATOR/ERECTOR CONSIDERING ORIENTATION OF PL, MEMBER WEIGHTS, AND ERECTION FORCES.
6. EXPOSED STEEL SHALL BE GALVANIZED AND WELDS SHALL BE TOUCHED UP WITH A ZINC RICH PRIMER PER THE STRUCTURAL NOTES. FINISH STEEL AND STEEL CONNECTIONS PER THE STRUCTURAL NOTES FOR ARCHITECTURALLY EXPOSED STEEL, SEE S002.

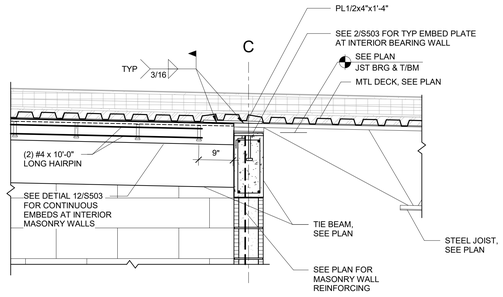
2 S504 TYPICAL TUBE TO TUBE COLUMN CONNECTION

3/4" = 1'-0"



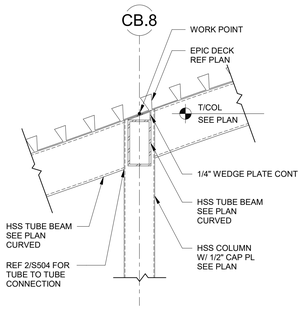
3 S504 TUBE TO MASONRY CONNECTION

3/4" = 1'-0"



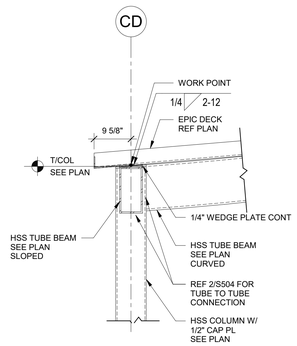
4 S504 COLLECTOR TRUSS CONNECTION TO SHEAR WALL

3/4" = 1'-0"



5 S504 TYPICAL CANOPY DETAIL 1

3/4" = 1'-0"



6 S504 TYPICAL CANOPY DETAIL 2

3/4" = 1'-0"

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OKALOOSA COUNTY

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WWW.MLM-MARTIN.COM
AA-C002208
MLM JOB #: TYPE PROPERTY

Jamese F. Spears, P.E.
Florida License #82786

Seal

SEAL

Revisions

No.	Date	Description

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TLC No.:719055

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THINK. LISTEN. CREATE.

Key Plan

Project No.:	MLM-19672
Designed By:	Designer
Drawn By:	Author
Checked By:	Checker
Issue Date:	30-NOV-2020
Drawing Scale:	3/4" = 1'-0"

Drawing Title:

SECTIONS AND DETAILS

BID DOCUMENTS

Drawing No.:

S504

BIM 360://Design of Satellite Concourse/VPS-MLM-S.rvt
12/1/2020 9:04:44 AM

HVAC SYMBOL LEGEND

SYMBOL	DESCRIPTION
	-CEILING DIFFUSER, ROUND NECK (CEILING DIFFUSERS ARE 4-WAY THROW UNO)
	-ROUND DIFFUSER
	-CEILING RETURN
	-CEILING EXHAUST
	-CEILING DIFFUSER, RECTANGULAR OR SQUARE NECK (CEILING DIFFUSERS ARE 4-WAY THROW UNO)
	-SUPPLY REGISTER OR GRILLE (VERTICAL MOUNT, SIDEWALL)
	-RETURN/EXHAUST REGISTER OR GRILLE (VERTICAL MOUNT, SIDEWALL)
1	-REVISION REFERENCE
1 M-1	-DETAIL REFERENCE: TOP-DETAIL#, BOTTOM-DRAWING# SHOWN ON
T	-THERMOSTAT/TEMPERATURE SENSOR
H	-HUMIDISTAT/HUMIDITY SENSOR
	-DUCT SMOKE DETECTOR
	-CONNECT TO EXISTING
	-DEMOLISH TO POINT INDICATED
M	-MOTORIZED CONTROL DAMPER
TS	-TEMPERATURE SENSOR
P	-PRESSURE SENSOR
BD	-BACKDRAFT DAMPER
N	-NEUTRAL RELATIVE PRESSURE
P	-POSITIVE RELATIVE PRESSURE
	-NEGATIVE RELATIVE PRESSURE
1	-SHEET NOTE CALLOUT
1	-SHEET NOTE CALLOUT
1	-SHEET NOTE CALLOUT
	-CEILING MOUNTED ACCESS DOOR

SYMBOL	DESCRIPTION
	-FIRE DAMPER (WITH ACCESS PANEL)
	-FIRE & SMOKE DAMPER (WITH ACCESS PANEL)
	-EXISTING FIRE DAMPER TO REMAIN
	-EXISTING FIRE & SMOKE DAMPER TO REMAIN
SA-1	-SOUND ATTENUATOR
M	-MOTOR OPERATED CONTROL DAMPER (MOD)
FM	-AIR FLOW MEASURING STATION
	-MANUAL BALANCING DAMPER
	-DOOR GRILLE
	-UNDERCUT DOOR
	-ACCESS DOORS, VERTICAL OR HORIZONTAL
	-STAINLESS STEEL DUCTWORK
	-FLEXIBLE CONNECTION
12x8	-FLAT OVAL DUCT
24x12	-NEW DUCTWORK, FIRST DIMENSION IS SIDE SHOWN
24x12	-EXISTING DUCTWORK TO REMAIN
24x12	-EXISTING DUCTWORK TO BE REMOVED
24x12 DOWN / UP W/IN FLOOR	-DUCT ELBOW, POSITIVE PRESSURE (SUPPLY), FIRST DIMENSION INDICATES SIDE TO WHICH ARROW IS POINTING
	-DUCT ELBOW, EXHAUST
	-DUCT ELBOW, NEGATIVE PRESSURE, RETURN
	-DUCT ELBOW UP THROUGH ROOF OR SLAB ABOVE
	-RECTANGULAR DUCT SECTION UP, POSITIVE PRESSURE, SUPPLY OR OUTSIDE AIR
	-RECTANGULAR DUCT SECTION UP, NEGATIVE PRESSURE, RETURN
	-RECTANGULAR DUCT SECTION UP, EXHAUST
	-ROUND DUCT SECTION UP
	-FLAT OVAL DUCT SECTION UP

SYMBOL	DESCRIPTION
	-TERMINAL UNIT, VARIABLE/CONSTANT AIR VOLUME WITH ELECTRIC HEAT
	-TERMINAL UNIT, VARIABLE/CONSTANT AIR VOLUME WITH ELECTRIC HEAT
	-TERMINAL UNIT, VARIABLE/CONSTANT AIR VOLUME, FAN POWERED
	-TERMINAL UNIT, VARIABLE/CONSTANT AIR VOLUME, FAN POWERED, WITH ELECTRIC HEAT
	-ELECTRIC DUCT HEATER (W/ PANEL CLEARANCE)
	-HYDRONIC REHEAT COIL
	-INLINE CENTRIFUGAL FAN
	-PACKAGED TERMINAL AIR CONDITIONER (PTAC)
UP DN	-CHANGE OF ELEVATION
	-FLEXIBLE DUCT
	-TRANSITION, CONCENTRIC
	-TRANSITION, ECCENTRIC
10x8 8"	-TRANSITION, SQUARE TO ROUND
	-SQUARE THROAT TEE
12x8	-RADIUS TEE
	-RECTANGLE-TO-ROUND TAKE-OFF
	-STANDARD BRANCH TAKE-OFF
	-SPIN-IN TAKE-OFF
	-SQUARE THROAT ELBOW W/TURNING VANES
	-RADIUS ELBOW
	-RECTANGULAR/ROUND BRANCH TAKE-OFF OR ROUND/ROUND BRANCH TAKE-OFF
	-EXHAUST DUCT UP THROUGH SLAB W/ FAN ON ROOF ABOVE
	-EXHAUST FAN ON ROOF W/ DUCT DOWN THROUGH ROOF

HVAC ABBREVIATIONS

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
AFD	-ADJUSTABLE FREQUENCY DRIVE	LD	-LINEAR DIFFUSER
AFF	-ABOVE FINISHED FLOOR	MBH	-THOUSAND BTUs PER HOUR
AFR	-ABOVE FINISHED ROOF	MCA	-MINIMUM CIRCUIT AMPS
AHU	-AIR HANDLING UNIT	MOCP	-MAXIMUM OVER CURRENT PROTECTION
AP	-ACCESS PANEL	MOD	-MOTOR OPERATED CONTROL DAMPER (MOD)
BOP	-BOTTOM OF PIPE	NC	-NORMALLY CLOSED
BHP	-BRAKE HORSEPOWER	NO	-NORMALLY OPEN
BTU	-BRITISH THERMAL UNIT	NTS	-NOT TO SCALE
CL	-CENTER LINE	OA	-OUTSIDE AIR
CFM	-CFM (CUBIC FEET PER MINUTE)	OAL	-OUTSIDE AIR LOUVER
CD	-CEILING DIFFUSER	PRV	-PRESSURE REDUCING VALVE
CT	-COOLING TOWER	PRS	-PRESSURE REDUCING STATION
CV	-CONSTANT AIR VOLUME	PSI	-POUNDS PER SQUARE INCH
ΔP	-CHANGE IN PRESSURE	PSIG	-PSI GAUGE
ΔT	-CHANGE IN TEMPERATURE	PTAC	-PACKAGED TERMINAL AIR CONDITIONER
CFM	-CUBIC FEET PER MINUTE	PVC	-POLYVINYL CHLORIDE PIPE
CU	-CONDENSING UNIT	RA	-RETURN AIR
DDC	-DIRECT DIGITAL CONTROLS	RHC	-REHEAT COIL
DN	-DOWN	RHP	-ROOFTOP HEAT PUMP
EAT	-ENTERING AIR TEMPERATURE	RPM	-REVOLUTIONS PER MINUTE
ESP	-EXTERNAL STATIC PRESSURE	RS/L	-REFRIGERANT SUCTION & LIQUID LINES
EWT	-ENTERING WATER TEMPERATURE	RTU	-ROOFTOP AIR HANDLING UNIT
FCU	-FAN COIL UNIT	SA	-SUPPLY AIR
FD	-FIRE DAMPER	SP	-STATIC PRESSURE
FF	-FINAL FILTERS	TSP	-TOTAL STATIC PRESSURE
FLA	-FULL LOAD AMPS	UNO	-UNLESS NOTED OTHERWISE
FPM	-FEET PER MINUTE	V/PH	-VOLTS/PHASE
GPM	-GALLONS PER MINUTE	VAV	-VARIABLE AIR VOLUME
KW	-KILOWATT	VFD	-VARIABLE FREQUENCY DRIVE
LAT	-LEAVING AIR TEMPERATURE		
LWT	-LEAVING WATER TEMPERATURE		

HVAC GENERAL NOTES

1. CONNECTION TO EQUIPMENT SHALL BE VERIFIED WITH MANUFACTURER'S CERTIFIED DRAWINGS. TRANSITIONS TO ALL EQUIPMENT SHALL BE VERIFIED AND PROVIDED FOR EQUIPMENT FURNISHED.
2. DIMENSIONS SHALL BE FIELD-VERIFIED AND COORDINATED PRIOR TO PROCUREMENT OR FABRICATION. COORDINATE THE WORK WITH OTHER TRADES INVOLVED. FIELD MODIFICATIONS SUCH AS OFFSETS IN PIPING OR DUCTWORK (INCLUDING DIVIDED DUCTWORK) NEEDED DUE TO OBSTRUCTIONS OR INTERFERENCES SHALL BE PROVIDED AT NO ADDITIONAL COST. FOR PROJECTS INVOLVING RENOVATION, COORDINATE NEW WORK WITH EXISTING ELEMENTS SUCH AS THE BUILDING STRUCTURE AND ARCHITECTURAL FEATURES, SPRINKLER PIPING, LIGHTS, PLUMBING, AND ELECTRICAL CONDUIT.
3. DUCT CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE SMACNA HVAC DUCT CONSTRUCTION STANDARD.
4. SEE SPECIFICATIONS FOR GAUGES, THICKNESS, BRACING, REQUIREMENTS, ETC., OF DUCTWORK.
5. PROVIDE AIR TURNING VANES IN ALL 90 DEGREE RECTANGULAR DUCT ELBOWS.
6. DUCT SIZES AND ALL OPENINGS THROUGH BUILDING CONSTRUCTION SHALL SUIT EQUIPMENT FURNISHED.
7. COORDINATE DIFFUSER, GRILLE AND REGISTER LOCATIONS WITH ARCHITECTURAL REFLECTED CEILING PLANS AND EQUIPMENT OF ALL TRADES.
8. LOCATE THERMOSTATS, TEMPERATURE SENSORS, HUMIDISTATS, AND HUMIDITY SENSORS AT 48" ABOVE FINISHED FLOOR UNLESS NOTED OTHERWISE. COORDINATE LOCATIONS WITH OTHER EQUIPMENT, FURNITURE, AND DOOR SWINGS.
9. ALL EQUIPMENT, DUCTWORK, ETC., SHALL BE SUPPORTED AS DETAILED AND/OR SPECIFIED. PROVIDE ADDITIONAL SUPPORTS AS REQUIRED TO PROVIDE A VIBRATION-FREE, RIGID INSTALLATION.
10. ALL DUCT SIZES SHOWN ARE INSIDE CLEAR DIMENSIONS.
11. DAMPERS AND INSIDES OF DUCTS VISIBLE THROUGH GRILLES, REGISTERS AND DIFFUSERS SHALL BE PAINTED FLAT BLACK.
12. REFER TO TYPICAL DETAILS FOR PIPING AND INSTALLATION OF EQUIPMENT.
13. TRAPPED CONDENSATE DRAINS FROM ALL MECHANICAL EQUIPMENT SHALL BE PROVIDED FOR PROPER DRAINAGE TO SUIT EQUIPMENT FURNISHED.
14. ACCESS PANELS IN DUCTWORK AND CEILINGS SHALL BE PROVIDED WHERE REQUIRED FOR OPERATION, BALANCING OR MAINTENANCE OF ALL MECHANICAL EQUIPMENT.
15. ALL DUCTWORK AND PIPING IS SHOWN SCHEMATICALLY. PROVIDE ALL TRANSITIONS, TURNING VANES, ELBOWS, FITTINGS, ETC., TO ALLOW SMOOTH FLOWS. ALL SPLIT DUCT FITTINGS SHALL TRANSITION TO FULL SIZE OF THE SUM OF BOTH BRANCHES, UPSTREAM OF SPLIT.
16. PROVIDE CONCRETE HOUSEKEEPING PAD UNDER ALL FLOOR-MOUNTED EQUIPMENT. REFER TO SPECIFICATIONS FOR DETAILED REQUIREMENTS.
17. VERIFY FINISH WITH ARCHITECT PRIOR TO PURCHASING GRILLES, REGISTERS, DIFFUSERS, LOUVERS AND OTHER AIR DISTRIBUTION DEVICES.
18. PROVIDE FLEXIBLE DUCT CONNECTIONS ON ALL DUCTWORK CONNECTING TO EACH FAN, AIR HANDLING UNITS, AND FAN COIL UNITS.
19. PROVIDE TRANSITIONS AT DIFFUSER NECKS AS REQUIRED TO MATCH SIZES OF FLEX DUCTS TO BE CONNECTED.
20. INTERRUPTIONS TO EXISTING SERVICES SHALL BE SCHEDULED FOR TIMES OTHER THAN NORMAL OPERATING HOURS (SUCH AS NIGHTS AND WEEKENDS). SUCH INTERRUPTIONS TO SERVICES SHALL NOT BE MADE WITHOUT THE PRIOR WRITTEN CONSENT OF THE OWNER'S REPRESENTATIVE AND PROPER COORDINATION WITH OTHER TRADES. PRE-WORK SHALL BE PERFORMED TO MAKE THE SHUTDOWN PERIOD AS BRIEF AS POSSIBLE.
21. ALL EQUIPMENT, DUCTWORK, ETC., TO BE REMOVED SHALL REMAIN PROPERTY OF THE OWNER OR DISPOSED OF LEGALLY, AS DIRECTED BY OWNER.
22. MAINTAIN CLEARANCE OF A MINIMUM OF 6" BETWEEN DUCTWORK, PIPING, EQUIPMENT, ETC., AND ALL FIRE RATED AND FIRE/SMOKE RATED PARTITIONS, TO ALLOW FOR INSPECTIONS OF RATED WALLS.
23. LOCATE ALL OUTSIDE AIR INTAKES A MINIMUM OF 10' CLEAR FROM ALL PLUMBING VENTS AND EXHAUST AIR DISCHARGE LOCATIONS.
24. DUCT RUNOUTS TO DIFFUSERS SHALL MATCH THE SIZE OF THE DIFFUSER NECK.
25. WATER PRESSURE DROPS THROUGH COIL CONTROL VALVES SHALL NOT EXCEED 5 PSI.
26. UNLESS OTHERWISE NOTED, ALL EQUIPMENT AND VALVE DRAINS SHALL BE INDEPENDENTLY PIPED FULL SIZE TO THE NEAREST PLUMBING DRAIN.
27. SLEEVE AND SEAL ALL PIPING PENETRATIONS THROUGH BUILDING PARTITIONS. PROVIDE MANUAL AIR VENTS AT ALL HIGH POINTS IN CHILLED WATER AND HOT WATER PIPING.
28. PIPING, DUCTWORK, LEAK PROTECTION APPARATUS, OR OTHER EQUIPMENT FOREIGN TO ELECTRICAL SWITCHBOARDS, PANELBOARDS, DISTRIBUTION BOARDS, OR MOTOR CONTROL CENTERS SHALL NOT BE INSTALLED WITHIN THE REQUIRED SPACE FOR WORKING CLEARANCES OR DEDICATED SPACES OF THE ELECTRICAL EQUIPMENT, EXTENDING IN FRONT OF AND FROM FLOOR TO STRUCTURAL CEILING WITH A WIDTH AND DEPTH OF THE ELECTRICAL EQUIPMENT IN ACCORDANCE WITH NEC-110.26.

HVAC PIPING SYMBOL LEGEND

SYMBOL	DESCRIPTION
CWS	-CONDENSER WATER SUPPLY
CWR	-CONDENSER WATER RETURN
CHWS	-CHILLED WATER SUPPLY
CHWR	-CHILLED WATER RETURN
CD	-CONDENSATE
CR	-CONDENSATE RETURN
PC	-PUMPED CONDENSATE
HWR	-HOT WATER RETURN
HWS	-HOT WATER SUPPLY
HPS	-HIGH PRESSURE STEAM SUPPLY
MPS	-MEDIUM PRESSURE STEAM SUPPLY
LPS	-LOW PRESSURE STEAM SUPPLY
HPR	-HIGH PRESSURE STEAM RETURN
MPR	-MEDIUM PRESSURE STEAM RETURN
LPR	-LOW PRESSURE STEAM RETURN
RL	-REFRIGERANT LIQUID
RS	-REFRIGERANT SUCTION
	-TEE, OUTLET DOWN
	-TEE, OUTLET UP
D D	-45° PIPE RISE (R) / DROP (D)
	-PIPE ANCHORS
	-CONCENTRIC REDUCER
	-ECCENTRIC REDUCER

SYMBOL	DESCRIPTION
	-FLOW DIRECTION
	-GATE VALVE
	-BALL VALVE
	-CALIBRATING BALANCING VALVE
	-BUTTERFLY VALVE
	-GAS COCK
	-UNION
	-STRAINER
	-CONTROL VALVE
	-SOLENOID VALVE
	-PSI REG.
	-CHECK VALVE
	-FLOW SWITCH
	-SLOPE DIRECTION (DOWN)
	-FLEX CONNECTION
	-O.S.&Y. GATE VALVE
	-STEAM TRAP
	-THREE-WAY CONTROL VALVE
	-THERMOMETER

SYMBOL	DESCRIPTION
EQUIP.	- P-TRAP
	-TWO-WAY CHECK VALVE
MV	-MANUAL VENT
	-PRESSURE GAUGE
	-RELIEF VALVE
FM	-FLOW METER
M	-WATER METER
	-INLINE PUMP
	-INLINE PUMP
	-VALVE ON RISER
	-CAP
	-CONNECTION, BOTTOM
	-CONNECTION, TOP
	-COUPLING
	-ELBOW, 90°
	-ELBOW, 45°
	-ELBOW, TURNED DOWN
	-ELBOW, TURNED UP

NOTE: SOME SYMBOLS SHOWN ON THIS LEGEND MAY NOT PERTAIN TO THIS PROJECT

HVAC EQUIPMENT TAGS

TAG: A 200 — CFM
-AIR DISTRIBUTION DEVICE

RTU NUMBER: RTU-1
-PACKAGED ROOFTOP UNIT

VARIABLE/CONSTANT AIR VOLUME TERMINAL UNITS

TERMINAL UNIT TYPE:
VTU - VARIABLE TERMINAL UNIT
CTU - CONSTANT TERMINAL UNIT
PTU - PARALLEL TERMINAL UNIT
STU - SERIES TERMINAL UNIT

VTU-1-1: AHU NUMBER — TERMINAL NUMBER

HVAC DRAWING INDEX

SHEET	DESCRIPTION
M001	MECHANICAL SYMBOLS, NOTES AND INDEX
M110	OVERALL MECHANICAL PLANS
M211	ENLARGED MECHANICAL PLAN LEVEL 1 - AREA 1
M212	ENLARGED MECHANICAL PLAN LEVEL 1 - AREA 2
M213	ENLARGED MECHANICAL PLAN LEVEL 1 - AREA 3
M214	ENLARGED MECHANICAL PLAN LEVEL 1 - AREA 4
M215	ENLARGED MECHANICAL PLAN LEVEL 1 - AREA 5
M216	ENLARGED MECHANICAL PLAN LEVEL 1 - AREA 6
M310	MECHANICAL SCHEDULES
M410	MECHANICAL DETAILS
M411	MECHANICAL DETAILS
M510	MECHANICAL CONTROLS
M511	MECHANICAL CONTROLS

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Drawing Title:
MECHANICAL SYMBOLS, NOTES AND INDEX

BID DOCUMENTS

Drawing No.:
M001

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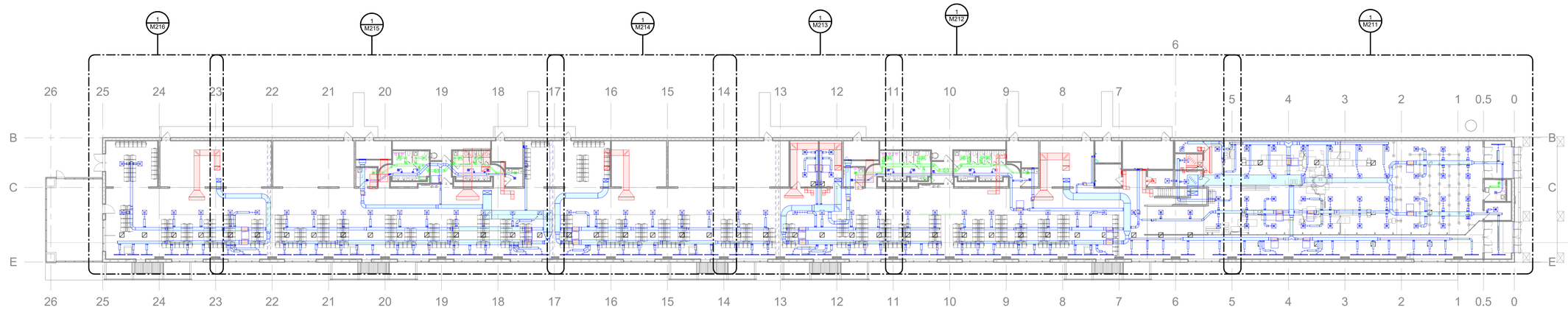
12/4/2020 9:59:56 AM

REFERENCED NOTES:

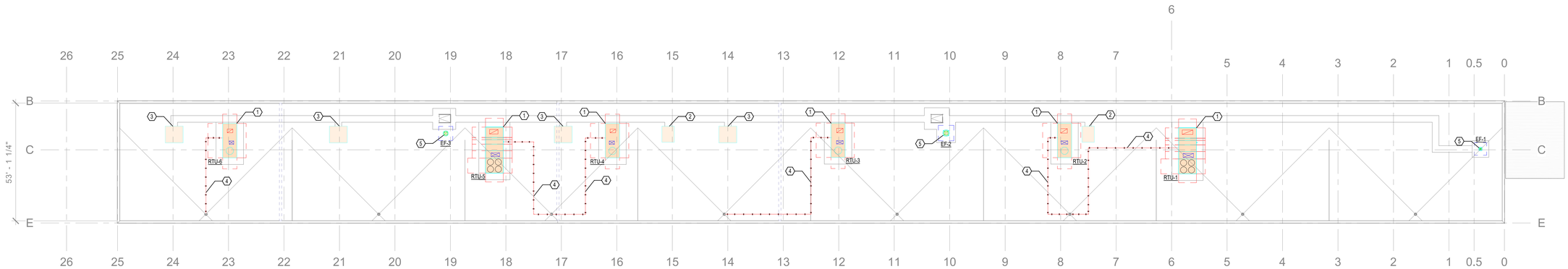
1. RTU MOUNTED ON FACTORY FABRICATED ROOF CURB. REFER TO DETAIL 3 & 5 ON SHEET M411 FOR REQUIREMENTS.
2. FUTURE CONCESSION RTU SHOWN FOR REFERNCE ONLY. APPROXIMATELY 5 TONS AND 1400 LBS TOTAL WEIGHT.
3. FUTURE CONCESSION RTU SHOWN FOR REFERNCE ONLY. APPROXIMATELY 8 TONS AND 2000 LBS TOTAL WEIGHT.
4. ROUTE SCH. 40 PVC CONDENSATE DRAIN PIPES TO NEAREST ROOF DRAIN. PROVIDE ADHESIVE TYPE PIPE ROOF SUPPORTS SPACED AT 4' APART. BASIS OF DESIGN PIPE PROP APS OR EQUIVALENT. (TYPICAL)
5. EXHAUST FAN MOUNTED ON FACTORY FABRICATED ROOF CURB. REFER TO DETAIL 2 ON SHEET M411 FOR REQUIREMENTS. MAINTIAN MINIMUM 10' CLEARANCE FROM ALL RTU OUTDOOR AIR INTAKES.



1 LEVEL 1 MECHANICAL OVERALL PLAN

1" = 20'-0"

NORTH



2 HVAC ROOF PLAN

1" = 20'-0"

NORTH

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Drawing Title:

OVERALL MECHANICAL PLANS

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Drawing No.:

M110

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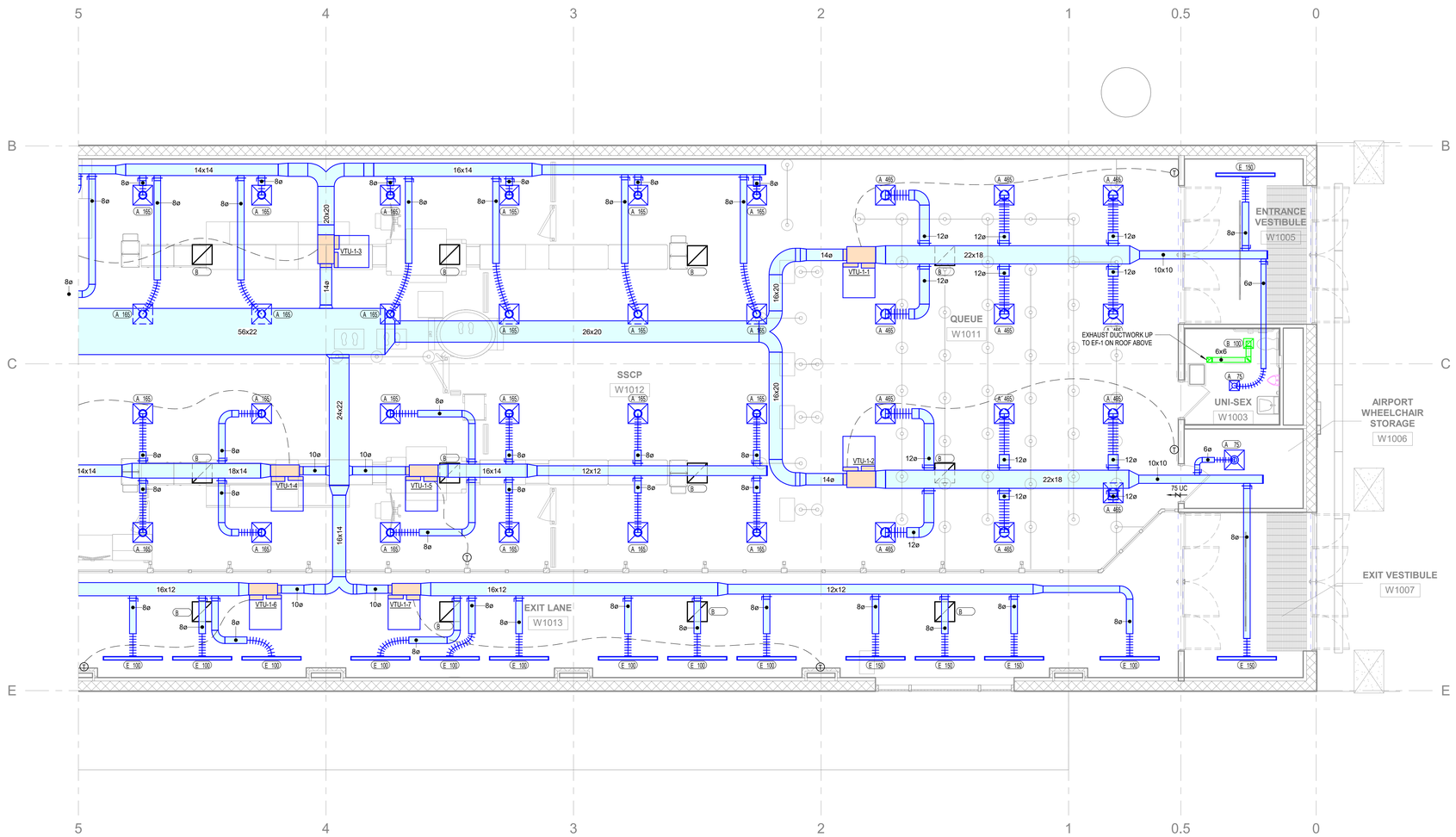

1 LEVEL 1 MECHANICAL PLAN - AREA 1

3/16" = 1'-0"

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Drawing Title:

ENLARGED MECHANICAL PLAN LEVEL 1 - AREA 1

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Drawing No.:

M211

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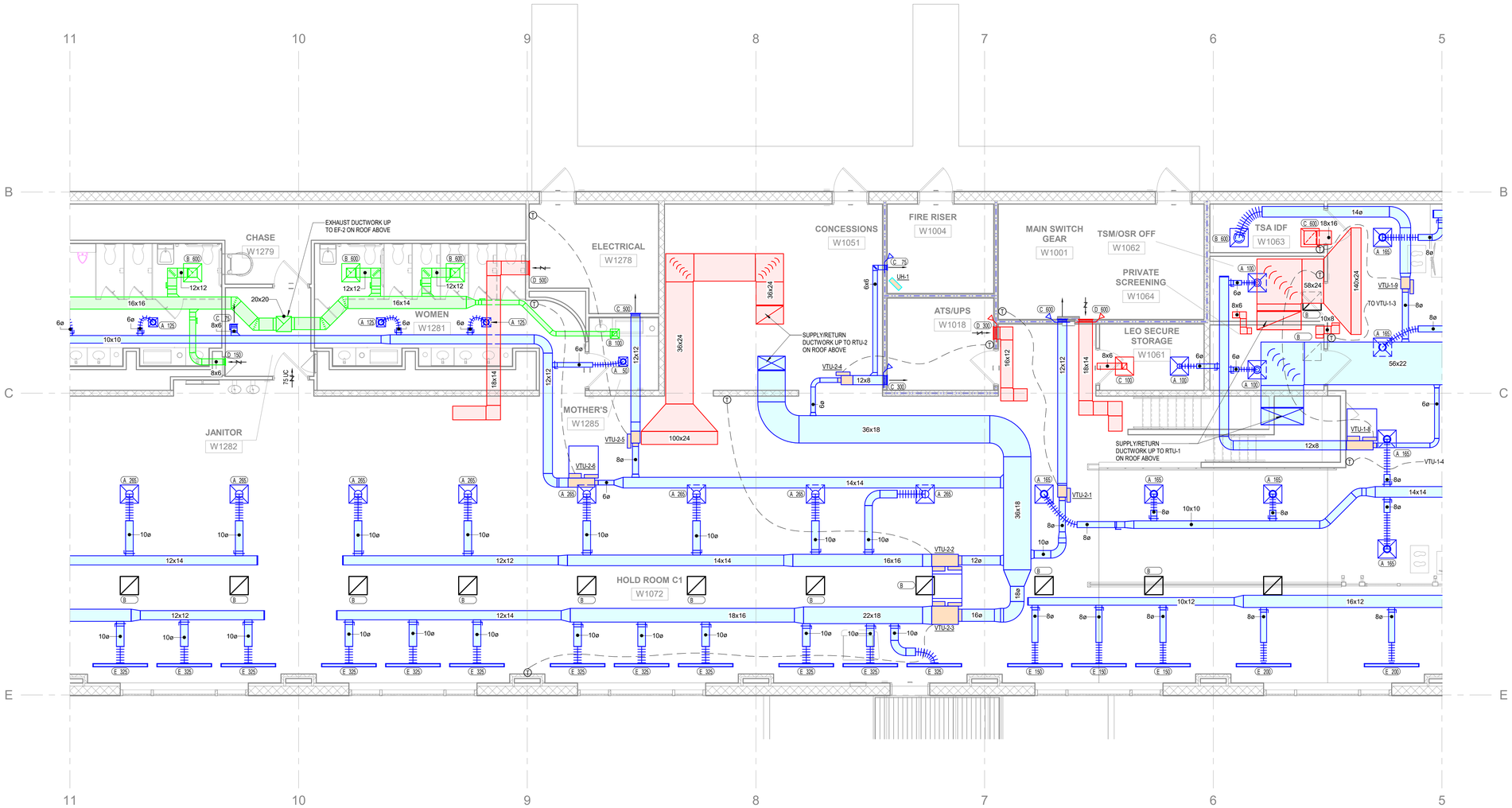

1 LEVEL 1 MECHANICAL PLAN - AREA 2

3/16" = 1'-0"

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Drawing Title:

ENLARGED MECHANICAL PLAN LEVEL 1 - AREA 2

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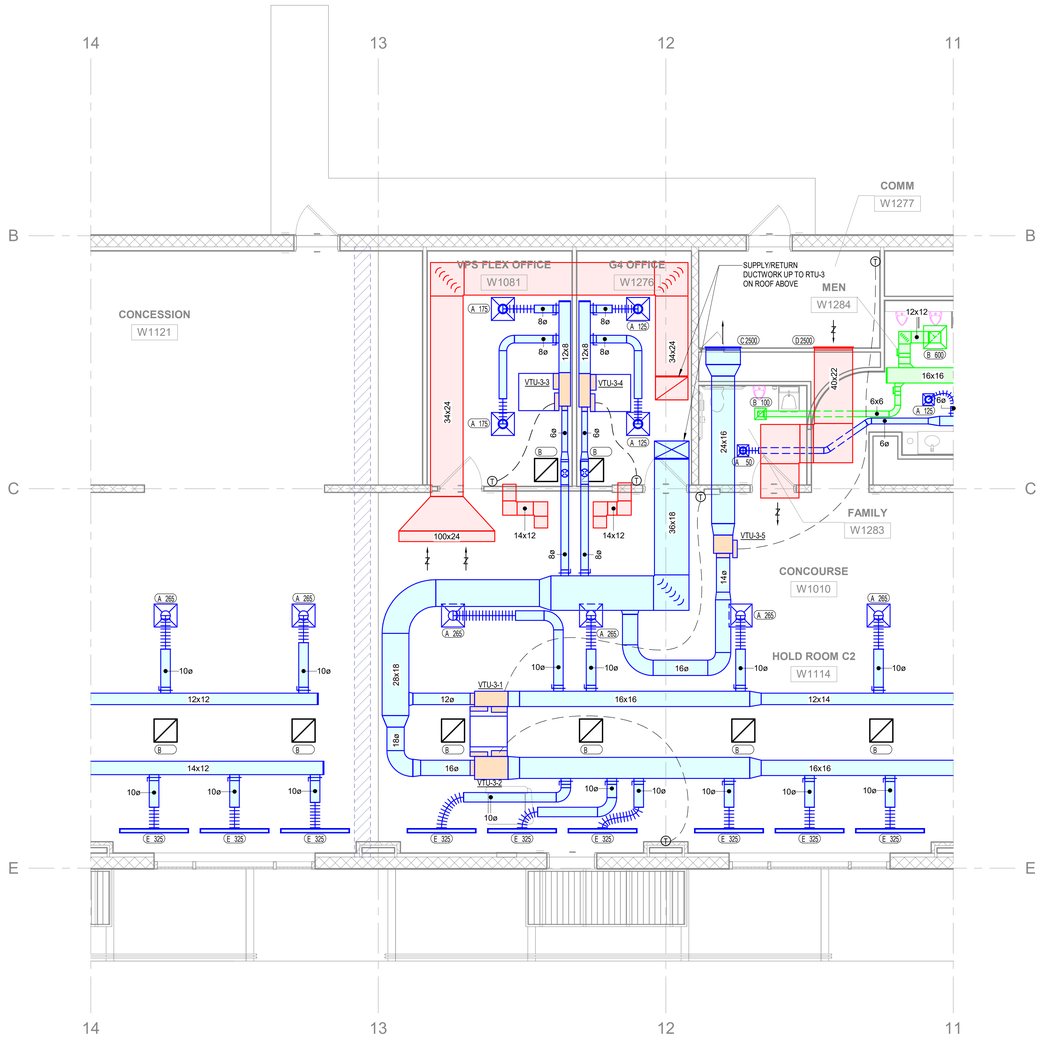
Drawing No.:

M212



1 LEVEL 1 MECHANICAL PLAN - AREA 3

3/16" = 1'-0"

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Drawing No.:

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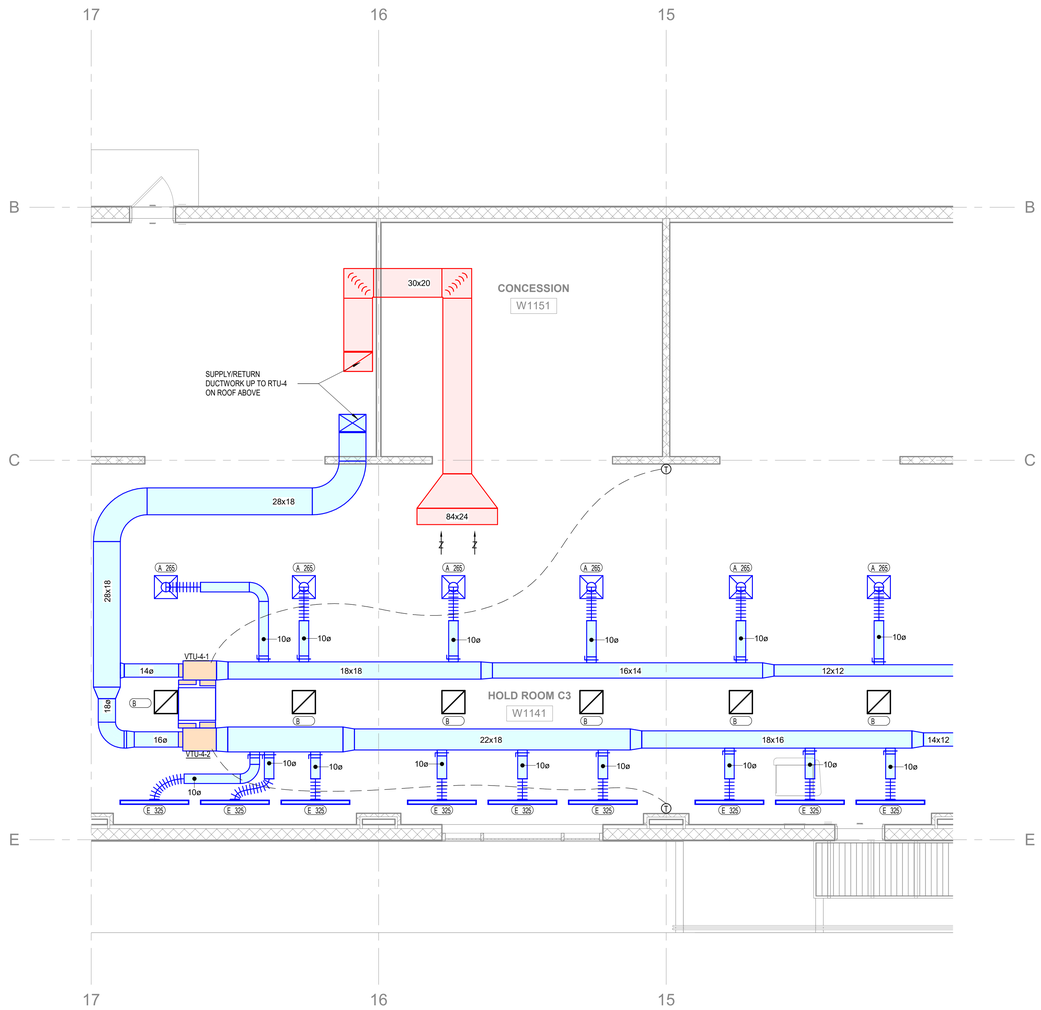

1 LEVEL 1 MECHANICAL PLAN - AREA 4

3/16" = 1'-0"

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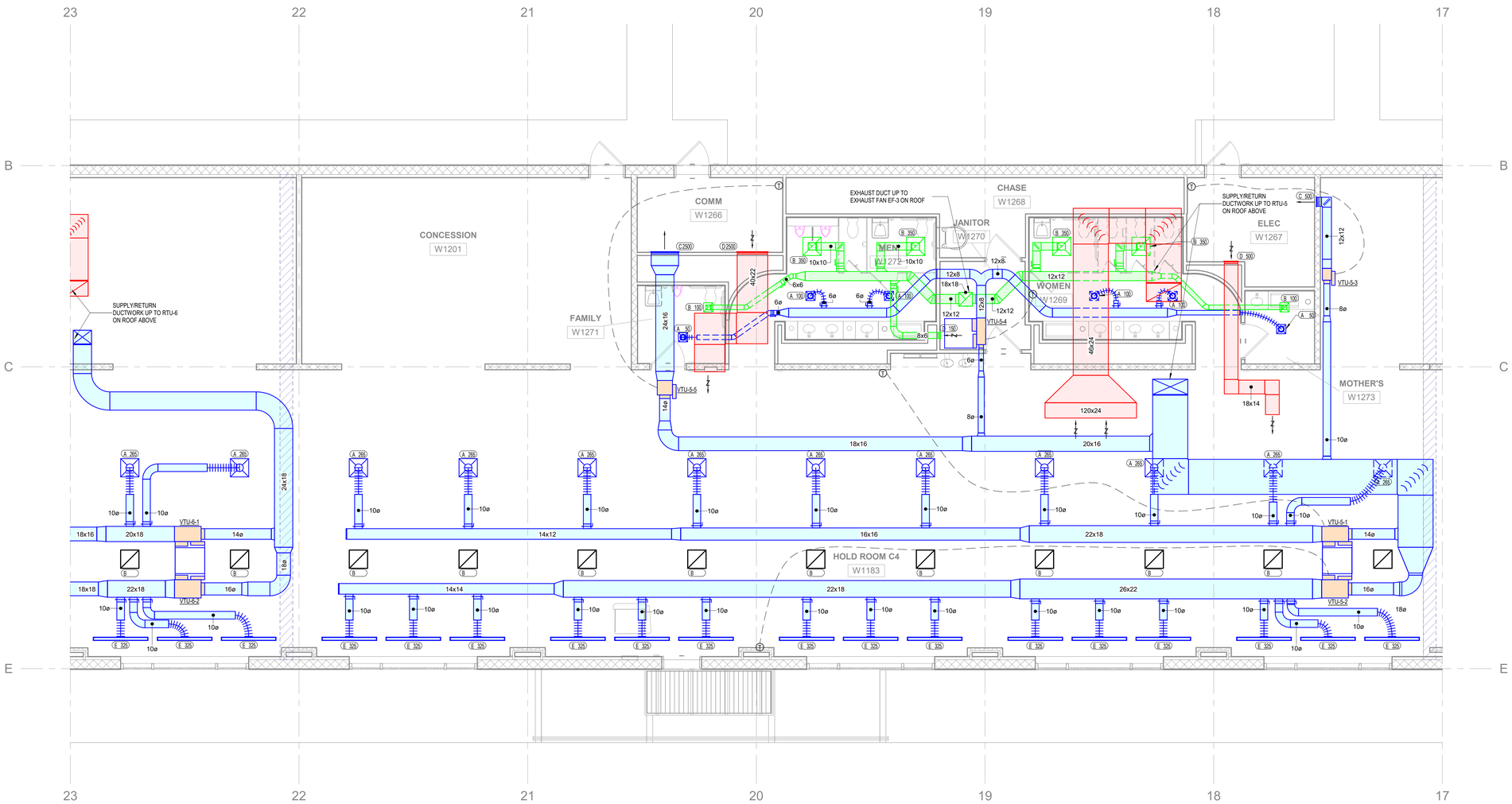

1 LEVEL 1 MECHANICAL PLAN - AREA 5

3/16" = 1'-0"

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ENLARGED MECHANICAL PLAN LEVEL 1 - AREA 5

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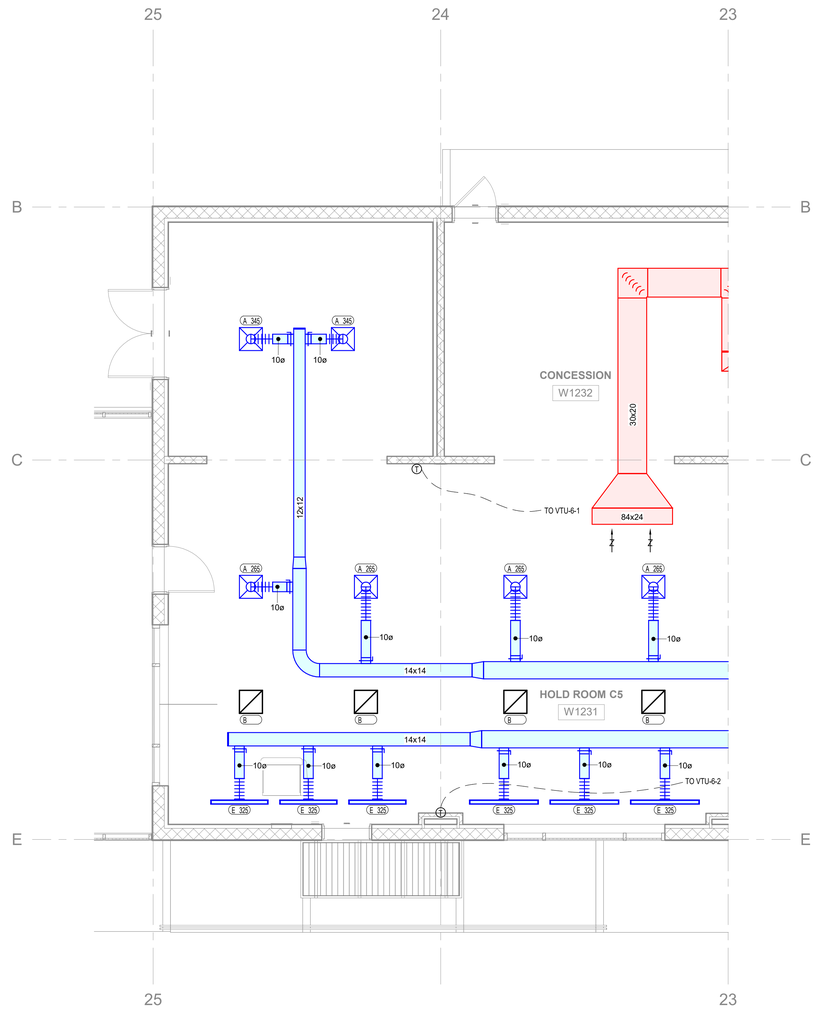

1 LEVEL 1 MECHANICAL PLAN - AREA 6

3/16" = 1'-0"

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Drawing Title:

ENLARGED MECHANICAL PLAN LEVEL 1 - AREA 6

BID DOCUMENTS

Drawing No.:

M216

PACKAGED DX ROOFTOP UNIT SCHEDULE

Mark	BASIS OF DESIGN		SUPPLY FAN DATA							DX COOLING COIL DATA								ELECTRIC HEATER DATA				FILTER DATA		ELECTRICAL DATA			
										AIR DATA		EAT		LAT		CAPACITY											
	MODEL	MANUFACTURER	AIRFLOW (CFM)	OA AIRFLOW (CFM)	ESP (IN WG)	FAN TYPE	FAN QTY.	MOTOR HP (EACH)	MOTOR BHP (EACH)	FACE VELOCITY (FPM)	ROWS	DB (°F)	WB (°F)	DB (°F)	WB (°F)	TOTAL MBH	SENSIBLE MBH	HEATING AIRFLOW (CFM)	HEATING EAT	HEATING LAT	HEATER KW	PRE-FILTER TYPE	FINAL-FILTER TYPE	MCA (A)	MOCP (A)	IEER @ OPERATING CONDITIONS	VOLTS/PHASE
RTU-1	DPSA050	DAIKIN	14,500	3,000	2.5	DIRECT DRIVE PLENUM	2	11.6	8.3	409	6	78.8	66.1	53	53	574	409	5,800	40	55	40	2" MERV 8	4" MERV 14	117.6	125	15.6	460/3
RTU-2	DPS025A	DAIKIN	6,670	1,200	2.5	DIRECT DRIVE PLENUM	1	10	7.5	388	6	78.3	65.6	53	53	286	198	2,700	40	55	30	2" MERV 8	4" MERV 14	63.2	80	16.8	460/3
RTU-3	DPS025A	DAIKIN	7,620	1,200	2.5	DIRECT DRIVE PLENUM	1	10	7.3	356	6	77.9	65.3	53	53	291	211	3,050	40	55	20	2" MERV 8	4" MERV 14	63.2	80	18	460/3
RTU-4	DPS020A	DAIKIN	6,000	1,200	2.5	DIRECT DRIVE PLENUM	1	7.5	6.45	280	6	78.7	66	53	53	248	174	2,400	40	55	20	2" MERV 8	4" MERV 14	50.8	80	19.4	460/3
RTU-5	DPSA035A	DAIKIN	11,000	1,500	2.5	DIRECT DRIVE PLENUM	2	7.3	5.7	415	6	77.5	65	53	53	423	307	4,400	40	55	40	2" MERV 8	4" MERV 14	87.3	100	16.5	460/3
RTU-6	DPS020A	DAIKIN	5,200	1,300	2.5	DIRECT DRIVE PLENUM	1	7.5	5.4	243	6	79.6	66.8	53	53	245	162	2,100	40	55	10	2" MERV 8	4" MERV 14	50.8	80	19.4	460/3

NOTES:

1. SEE SPECIFICATIONS FOR APPROVED MANUFACTURERS AND ADDITIONAL REQUIREMENTS.
2. CAPACITIES SHOWN ARE MINIMUM.
3. PRESSURE DROPS ARE MAXIMUM.
4. COORDINATE PIPING AND DUCT CONNECTION ORIENTATIONS WITH PLANS.
5. ALL MOTORS SHALL BE MOTOR MANUFACTURER'S HIGHEST "PREMIUM" EFFICIENCY OFFERING AVAILABLE.
6. PROVIDE ONE (1) SET OF CONSTRUCTION AIR FILTERS AND ONE (1) SET OF NEW FILTERS TO BE INSTALLED AT TIME OF C.O.
7. INSTALL PER MANUFACTURERS WRITTEN INSTALLATION INSTRUCTIONS.
8. PROVIDE STAINLESS STEEL DRAIN PAN.
9. PROVIDE ALL MECHANICAL CODE AND ENERGY CODE REQUIRED CLEARANCES.
10. SEE DIVISION 26 FOR DISCONNECT.
11. PROVIDE CONDENSATE TRAP AND PIPING FROM UNIT TO NEAREST ROOF DRAIN.
12. PROVIDE WITH FACROTY FABRICATED INSULATED ROOF CURB.
13. PROVIDE WITH MANUFACTURER'S COIL PROTECTION COATING.
14. PROVIDE WITH EBTRON GOLD AIRFLOW MEASUREMENT STATION FOR OUTDOOR AIRFLOW MONITORING.
15. PROVIDE WITH BACNET COMMUNICATION INTERFACE.
16. PROVIDE INDEPENDENTLY CIRCUITED CONVENIENCE OUTLET AND MARINE LIGHTS.
17. PROVIDE HOT GAS REHEAT.
18. RTU-1 & RTU-2: PROVIDE WITH A MINIMUM OF FOUR (4) COMPRESSORS FOR 25% TURNDOWN.
19. RTU-2, RTU-3, RTU-4, AND RTU-6: AT LEAST ONE COMPRESSOR SHALL BE AN INTERTER SCROLL FOR CAPACITY MODULATION.
20. EACH RTU SHALL BE CAPABLE OF AIRFLOW MODULATION DOWN TO 30% OF MAXIMUM DESIGN AIRFLOW.
21. EACH RTU SHALL HAVE THERMALLY BROKEN DOUBLE WALL CONSTRUCTION WITH MINIMUM R-13 INSULATION.
22. EACH RTU SHALL HAVE FACTORY PAINTED EXTERIORS, 1000 HR SALT SPRAY ASTM B-117.

FAN SCHEDULE

MARK	MANUFACTURER	MODEL	TYPE	CFM	SP (IN. WG.)	MAX FAN RPM	MAX SONES	MOTOR			DRIVE TYPE	FAN SERVICE
								HP	RPM	VOLTS/PHASE		
EF-1	GREENHECK	G-60-VG	ROOF MOUNTED	100	0.25	1725	3.3	1/15	1725	120/1	DIRECT	RESTROOM EXHAUST
EF-2	GREENHECK	G-163-VG	ROOF MOUNTED	2750	1	1725	16.2	2	1725	208/1	DIRECT	RESTROOM EXHAUST
EF-3	GREENHECK	G-133-VG	ROOF MOUNTED	1,750	1	1725	14.1	3/4	1725	120/1	DIRECT	RESTROOM EXHAUST

NOTES:

1) ROOF CURB
2) SERVICE DISCONNECT SWITCH
3) PROVIDE DIAL ON MOTOR SPEED CONTROL FOR EC MOTOR
4) PROVIDE MOTOR STARTER WITH BAS INTEGRATION (COMPATIBLE WITH EC MOTOR AS APPLICABLE).
5) PROVIDE BACKDRAFT DAMPER.
6) CERTIFIED HIGH WIND RESISTANT FAN AND CURB ASSEMBLY. CURB AND FAN ASSEMBLY SHALL BE CERTIFIED FOR USE WITHOUT THE USE OF ADDITIONAL CABLE OR GUY-WIRE RESTRAINTS, WHEN CURB IS ANCHORED TO ROOF AND FAN ANCHORED TO CURB IN ACCORDANCE WITH MANUFACTURER'S CERTIFIED INSTALLATION INSTRUCTIONS.
7) PROVIDE FAN WITH EC FAN MOTOR.

SINGLE DUCT VAV TERMINAL UNIT SCHEDULE (ELECTRIC HEAT)

PLAN MARK	BASIS OF DESIGN		INLET SIZE	COOLING MAX (CFM)	COOLING MIN(CFM)	HEATING (CFM)	MAX AIR PRESS. DROP (IN. WG)	ELECTRIC HEATING COIL DATA			HEATING CONTROL STEPS
	MFGR	MODEL						EAT (°F)	LAT (°F)	KW	
VTU-1-1	PRICE	SDV	14"	3015	910	1200	0.25	55	85	12	SCR
VTU-1-2	PRICE	SDV	14"	3015	910	1200	0.25	55	75	8	SCR
VTU-1-3	PRICE	SDV	14"	2310	700	950	0.25	55	85	9.5	SCR
VTU-1-4	PRICE	SDV	10"	1485	500	660	0.25	55	75	4.5	SCR
VTU-1-5	PRICE	SDV	10"	1320	400	550	0.25	55	75	3.5	SCR
VTU-1-6	PRICE	SDV	10"	1150	360	460	0.25	55	85	4.5	SCR
VTU-1-7	PRICE	SDV	10"	1150	345	460	0.25	55	85	4.5	SCR
VTU-1-8	PRICE	SDV	6"	300	100	100	0.25	55	85	1	SCR
VTU-2-2	PRICE	SDV	12"	1590	480	640	0.25	55	75	4	SCR
VTU-2-3	PRICE	SDV	16"	2925	870	1170	0.25	55	85	11.5	SCR
VTU-2-6	PRICE	SDV	6"	675	180	270	0.25	55	80	2.5	SCR
VTU-3-1	PRICE	SDV	12"	1590	560	640	0.25	55	75	4	SCR
VTU-3-2	PRICE	SDV	16"	2925	870	1170	0.25	55	85	11.5	SCR
VTU-3-3	PRICE	SDV	6"	350	100	100	0.25	55	85	1	SCR
VTU-3-4	PRICE	SDV	6"	250	100	100	0.25	55	85	1	SCR
VTU-4-1	PRICE	SDV	14"	2120	550	850	0.25	55	75	5.5	SCR
VTU-4-2	PRICE	SDV	16"	3900	1,170	1560	0.25	55	85	15.5	SCR
VTU-5-1	PRICE	SDV	14"	2650	800	1060	0.25	55	75	7	SCR
VTU-5-2	PRICE	SDV	16"	4875	1,460	1950	0.25	55	85	19	SCR
VTU-5-4	PRICE	SDV	6"	500	150	200	0.25	55	80	2	SCR
VTU-6-1	PRICE	SDV	14"	2280	680	900	0.25	55	75	6	SCR
VTU-6-2	PRICE	SDV	16"	2925	870	1170	0.25	55	85	11.5	SCR

NOTES:

1. SEE SPECIFICATIONS FOR OTHER APPROVED MANUFACTURERS AND ADDITIONAL REQUIREMENTS.
2. UNITS SHALL BE PRESSURE INDEPENDENT, NORMALLY OPEN.
3. SOUND DATA SHALL BE OBTAINED FROM TESTS CONDUCTED IN ACCORDANCE WITH ARI STANDARD 880.
4. MAX NC-30 AT 1" W.C. INLET STATIC PRESSURE. PROVIDE FACTORY SOUND ATTENUATOR AS REQUIRED.
5. MANUFACTURER SHALL FACTORY MOUNT AND TEST CONTROLS ON ALL TERMINALS.
6. 1" RIGID INSULATION WITH FOIL FACE TOWARD AIRSTREAM.
7. UNITS WITH HEATERS SHALL BE VAV FOR COOLING AND CONSTANT VOLUME FOR HEATING.
8. AIR PRESSURE DROP INDICATED IS AT FULL-OPEN POSITION AND INCLUDES HEATING COIL DROP WHERE APPLICABLE.
9. MINIMUM COOLING CFM SHALL BE AS SHOWN DURING OCCUPIED MODE, BUT SHALL BE ZERO (0) CFM (FULL-SHUTOFF) DURING UNOCCUPIED COOLING MODE.
10. HEATING COILS LESS THAN 4.5KW SHALL BE 277V/1PH. HEATING COILS 4.5KW AND GREATER SHALL BE 480V/3PH. SINGLE-POINT CONNECTIONS.
11. PROVIDE FACTORY-INSTALLED AND WIRED STEP-DOWN TRANSFORMER FOR CONTROL POWER. TRANSFORMER INPUT VOLTAGE SHALL MATCH HEATER VOLTAGE. (FOR TERMINALS WITHOUT HEATER, PROVIDE 277V PRIMARY TRANSFORMER VOLTAGE.)
12. PROVIDE WITH FACTORY-MOUNTED INTEGRAL FUSED DISCONNECT SWITCH.

SINGLE DUCT VAV TERMINAL UNIT SCHEDULE

PLAN MARK	BASIS OF DESIGN		INLET SIZE	AIRFLOW		MAX AIR PRESS. DROP
	MFGR	MODEL		COOLING DESIGN (CFM)	COOLING MINIMUM (CFM)	
VTU-1-9	PRICE	SDV	8"	600	180 CFM	0.25 in-wg
VTU-2-1	PRICE	SDV	8"	600	180 CFM	0.25 in-wg
VTU-2-4	PRICE	SDV	6"	375	113 CFM	0.25 in-wg
VTU-2-5	PRICE	SDV	8"	500	150 CFM	0.25 in-wg
VTU-3-5	PRICE	SDV	14"	2500	750 CFM	0.25 in-wg
VTU-5-3	PRICE	SDV	8"	500	150 CFM	0.25 in-wg
VTU-5-5	PRICE	SDV	14"	2500	750 CFM	0.25 in-wg

NOTES:

1. SEE SPECIFICATIONS FOR OTHER APPROVED MANUFACTURERS AND ADDITIONAL REQUIREMENTS.
2. UNITS SHALL BE PRESSURE INDEPENDENT, NORMALLY OPEN.
3. SOUND DATA SHALL BE OBTAINED FROM TESTS CONDUCTED IN ACCORDANCE WITH ARI STANDARD 880.
4. MAX NC-30 AT 1" W.C. INLET STATIC PRESSURE. PROVIDE FACTORY SOUND ATTENUATOR AS REQUIRED.
5. MANUFACTURER SHALL FACTORY MOUNT AND TEST CONTROLS ON ALL TERMINALS.
6. 1" RIGID INSULATION WITH FOIL FACE TOWARD AIRSTREAM.
7. UNITS WITH HEATERS SHALL BE VAV FOR COOLING AND CONSTANT VOLUME FOR HEATING.
8. AIR PRESSURE DROP INDICATED IS AT FULL-OPEN POSITION.
9. MINIMUM COOLING CFM SHALL BE AS SHOWN DURING OCCUPIED MODE, BUT SHALL BE ZERO (0) CFM (FULL-SHUTOFF) DURING UNOCCUPIED COOLING MODE.
10. PROVIDE SINGLE-POINT CONNECTIONS.
11. PROVIDE FACTORY-INSTALLED AND WIRED STEP-DOWN TRANSFORMER FOR CONTROL POWER. PROVIDE 277V PRIMARY TRANSFORMER VOLTAGE.
12. PROVIDE WITH FACTORY-MOUNTED INTEGRAL FUSED DISCONNECT SWITCH.

AIR DISTRIBUTION SCHEDULE

PLAN MARK	CFM	NECK SIZE	FACE SIZE	DESCRIPTION	ADDITIONAL REQUIREMENTS
A	000-110 111-240 241-420 421-620 621-800 951-1000	6" 8" 10" 12" 14" 15"	24x24 24x24 24x24 24x24 24x24 24x24	BASIS OF DESIGN: PRICE ASPD COLOR: WHITE MATERIAL: ALUMINUM OPPOSED BLADE DAMPERS: NO	CEILING DIFFUSER SURFACE-MOUNT: BORDER TYPE 1 LAY-IN: BORDER TYPE 3 W/ 24x24 FACE
B	000-110 111-220 221-350 351-530 531-730 731-970 970-1240 1241-1540 1541-1880	6x6 8x8 10x10 12x12 14x14 16x16 18x18 20x20 22x22	24x24 24x24 24x24 24x24 24x24 24x24 24x24 24x24 24x24	BASIS OF DESIGN: PRICE 80 COLOR: WHITE VOLUME DAMPERS: NO 1/2"x1/2"1/2" EGGCRATE GRID, SQUARE NECK & FACE. FOR DUCTED RETURN & EXHAUST, SIZE PER SCHEDULE. FOR TRANSFER, SEE PLANS FOR SIZE.	CEILING/WALL GRILLE SURFACE-MOUNT: BORDER TYPE 1 LAY-IN: BORDER TYPE 3 W/24x24 FACE
	IF NO CFM IS INDICATED, NECK SIZE SHALL EQUAL DUCT SIZE (TRANSFER GRILLE APPLICATION)				
C	SEE PLANS FOR CFM & NECK SIZE. NECK SIZE EQUALS DUCT SIZE, UNLESS OTHERWISE NOTED ON DRAWINGS.		FACE SIZE EQUALS NECK SIZE PLUS 2".	BASIS OF DESIGN: PRICE 520 COLOR: WHITE MATERIAL: ALUMINUM OPPOSED BLADE DAMPERS: YES DOUBLE DEFLECTION, 3/4" BLADE SPACING, FRONT BLADES HORIZONTAL, FOR SUPPLY, THRU-WALL, SURFACE	SUPPLY REGISTER SURFACE-MOUNT: BORDER TYPE 1
D	SEE PLANS FOR CFM & NECK SIZE. NECK SIZE EQUALS DUCT SIZE, UNLESS OTHERWISE NOTED ON DRAWINGS.		FACE SIZE EQUALS NECK SIZE PLUS 2".	BASIS OF DESIGN: PRICE 530 COLOR: WHITE MATERIAL: EXTRUDED ALUMINUM OPPOSED BLADE DAMPERS: NO 0° FIXED DEFLECTION 3/4" SPACING	RETURN/EXHAUST SIDEWALL GRILLE
E	CFM/FT 00-35 36-65 66-90 91-110 111-130 131-155 156-180 181-200	SLOTS 1 2 3 4 5 6 7 8	LENGTH SEE PLAN	LINEAR SLOT SUPPLY DIFFUSER BASIS OF DESIGN: PRICE SDS COLOR: WHITE MATERIAL: ALUMINUM OPPOSED BLADE DAMPERS: NO ADJUSTABLE PATTERN CONTROLLER 1" SLOT FIELD-FABRICATED PLENUM	

NOTES:

1. AIR DISTRIBUTION DEVICES LOCATED WITHIN ACOUSTICAL TILE CEILINGS SHALL BE PROVIDED WITH BORDER TYPE 3 FOR LAY-IN MOUNTING. AIR DISTRIBUTION DEVICES LOCATED WITHIN GYPSUM BOARD CEILINGS OR WALLS SHALL BE PROVIDED WITH BORDER TYPE 1 FOR SURFACE MOUNTING. REFER TO ARCHITECTURAL DOCUMENTS FOR CEILING TYPES.

2. AIR DISTRIBUTION DEVICES LOCATED IN SMALL ROOMS WHERE FULL 24x24 LAY-IN GRID SPACE IS NOT AVAILABLE SHALL BE PROVIDED WITH SURFACE MOUNTING BORDERS IN LIEU OF LAY-IN, AND SHALL BE SURFACE-MOUNTED IN A CEILING TILE. SECURE EACH SUCH DEVICE TO CEILING GRID WITH FIELD-FABRICATED SUPPORTS ON TOP SIDE OF TILE, SO THAT TILE DOES NOT SAG OR CRACK.

ELECTRIC UNIT HEATER SCHEDULE

MARK	HEATER TYPE	AIR FLOW (CFM)	SIZE (KW)	VOLTS/PHASE
UH-1	ELECTRIC	400	3.3	277/1

1. BASIS OF DESIGN TRANE UHEC.
2. PROVIDE INTEGRAL DISCONNECT SWITCH.
3. PROVIDE WITH INTEGRAL THERMOSTAT.
4. PROVIDE ALL REQUIRED MOUNTING HARDWARE.

OKALOOSA COUNTY

FLY VPS

C19-2811-AP
Construction
of Satellite
Concourse 'C'

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
SUITE 107
MAITLAND, FL 32751
407.897.6764 (VOICE)
407.894.1338 (FAX)
WWW.MLM-MARTIN.COM
AA-C002208
MLM JOB # TYPE PROPERTY

SEAL

Revisions

No.	Date	Description

TLC ENGINEERING SOLUTIONS

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TLC No.:7190055
THINK. LISTEN. CREATE.

Project No.:	MLM-19672
Designed By:	OD
Drawn By:	OD
Checked By:	OD
Issue Date:	30-NOV-2020
Drawing Scale:	12" = 1'-0"

Drawing Title:

MECHANICAL SCHEDULES

BID DOCUMENTS

Drawing No.:

M310

BIM 360://Design of Satellite Concourse/VPS-MLM_MEP.rvt
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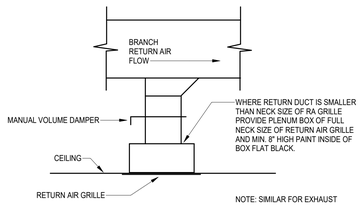

RETURN AIR BRANCH CONNECTION DETAIL | 6

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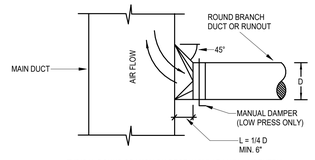
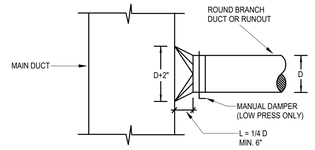
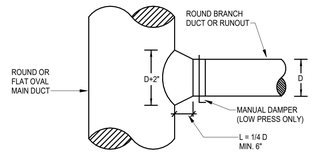


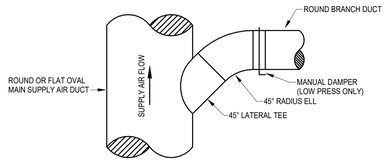
TYPICAL ROUND BRANCH ON RECTANGULAR MAIN - 45° ENTRY



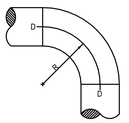
TYPICAL ROUND BRANCH ON RECTANGULAR MAIN - CONICAL



TYPICAL ROUND BRANCH FROM ROUND/FLAT OVAL - CONICAL

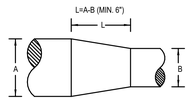


TYPICAL ROUND BRANCH FROM ROUND/FLAT OVAL - 45° LATERAL

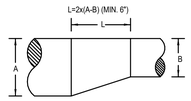


RADIUS ELL

- RADIUS ELLS SHALL BE USED IN ALL LOCATIONS WHERE SPACE PERMITS
- NOT RESTRICTED TO 90° - USE FOR ALL ANGLES
- LONG RADIUS (>1500 FPS): CENTERLINE RADIUS (R)=2(D)
- STANDARD RADIUS (1000-1500 FPS): CENTERLINE RADIUS (R)=1.5(D)
- SHORT RADIUS (<1000 FPS): CENTERLINE RADIUS (R)=(D)



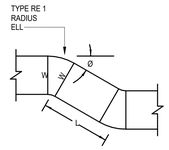
TYPICAL CONCENTRIC REDUCER



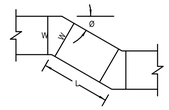
TYPICAL ECCENTRIC REDUCER

TYPICAL ROUND DUCT FITTING CONSTRUCTION | 4

No Scale



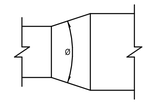
OFFSET TYPE 3 - RADIUSED



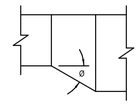
OFFSET TYPE 2 - MITERED

- FOR L<X, MAX ANGLE 15°
- FOR X<L<2X, MAX ANGLE 30°
- FOR 2X<L<3X, MAX ANGLE 45°
- FOR L>3X, NO ANGLE RESTRICTION (STANDARD ELBOWS GOVERN)

TYPICAL RECTANGULAR OFFSETS

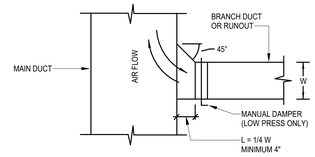


CONCENTRIC TRANSITION
Ø MAX = 45° DIVERGING, 60° CONVERGING

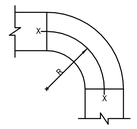


ECCENTRIC TRANSITION
Ø MAX = 30°

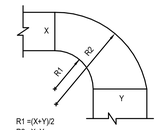
TYPICAL RECTANGULAR TRANSITIONS



TYPICAL RECTANGULAR BRANCH



TYPE RE 1 - RADIUS

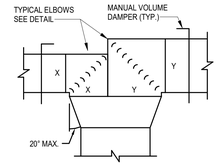


R1 =(X+Y)/2
R2 =X+Y

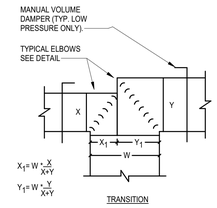
TYPE RE 5 - DUAL RADIUS

- TYPE RE 1 RADIUS ELLS SHALL BE USED IN ALL LOCATIONS WHERE SPACE PERMITS
- NOT RESTRICTED TO 90° - USE FOR ALL ANGLES
- LONG RADIUS (>1500 FPS): CENTERLINE RADIUS (R)=2(X)
- STANDARD (1000-1500 FPS): CENTERLINE RADIUS (R)=1.5(X)
- SHORT RADIUS (<1000 FPS): CENTERLINE RADIUS (R)=(X)

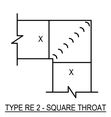
TYPICAL RADIUSED RECTANGULAR DUCT ELBOWS



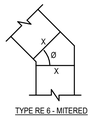
EQUAL



TRANSITION



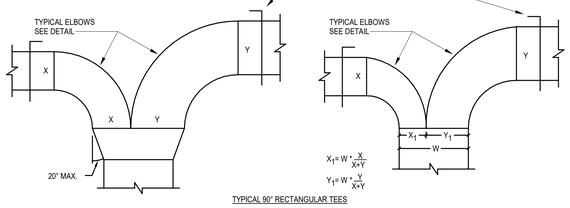
TYPE RE 2 - SQUARE THROAT



TYPE RE 6 - MITERED

- FOR USE ONLY WHERE SPACE DOES NOT PERMIT USE OF A RADIUSED ELL
- NOT RESTRICTED TO 90° - USE FOR ALL ANGLES
- PROVIDE DOUBLE THICKNESS VANES PER SMACNA DUCT CONSTRUCTION STANDARDS
- VANES SHALL BE UTILIZED IN ALL MITERED ELLS GREATER THAN 45° WHEN VELOCITY EXCEEDS 750 FPS
- FOR VERY LOW VELOCITY (<750 FPS) VANES MAY BE OMITTED

TYPICAL MITERED RECTANGULAR DUCT ELBOWS



EQUAL

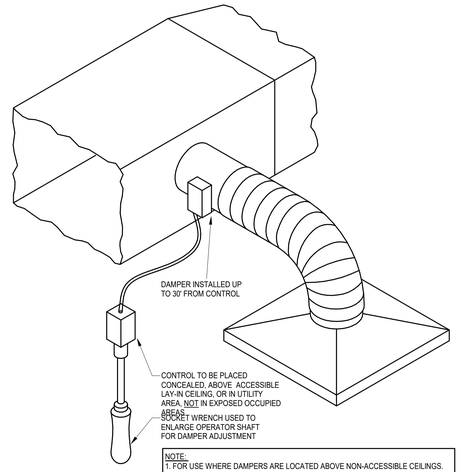
TYPICAL 90° RECTANGULAR TEES

TRANSITION

NOTE:
MANUAL VOLUME DAMPER REQUIRED WHERE BRANCH SERVES MULTIPLE DIFFUSERS/GRILLES.

TYPICAL RECTANGULAR DUCT FITTING CONSTRUCTION | 1

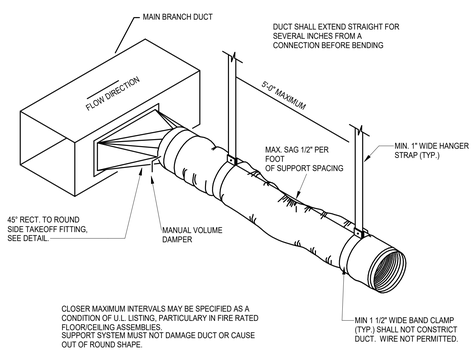
No Scale



NOTE:
1. FOR USE WHERE DAMPERS ARE LOCATED ABOVE NON-ACCESSIBLE CEILINGS.
2. ROUTE REMOTE OPERATOR TO AN ACCESSIBLE LOCATION SUCH AS ABOVE A LAY-IN CEILING OR UTILITY SPACE.

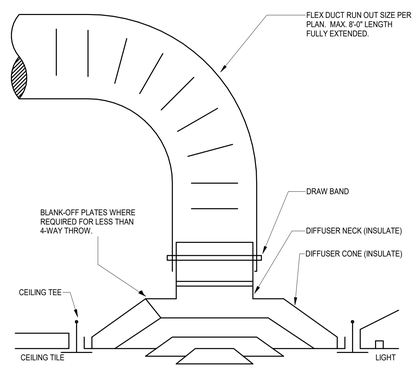
CABLE CONTROL VOLUME DAMPER | 7

No Scale



FLEXIBLE DUCT SUPPORT DETAIL | 8

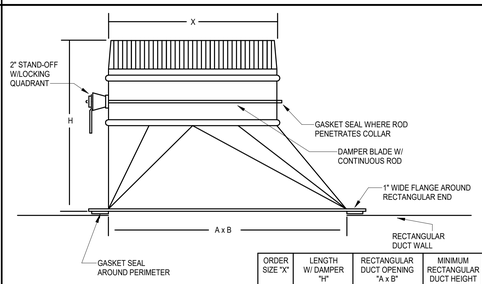
No Scale



ELEVATION VIEW

DIFFUSER MOUNTING DETAIL | 5

No Scale



NOTES:

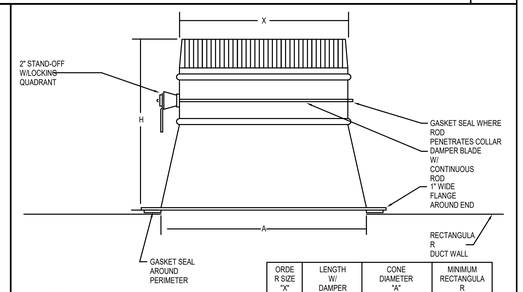
1. USE RECTANGULAR TO ROUND BRANCH TAKEOFF FITTING FOR ALL DIFFUSER RUN-OUTS.
2. SPRAY PAINT ALL DAMPER HANDLES ORANGE.

ORDER SIZE "X"	LENGTH W/ DAMPER "H"	RECTANGULAR DUCT OPENING "A x B"	MINIMUM RECTANGULAR DUCT HEIGHT
5"	13"	5"x9"	7"
6"	13"	5"x9"	7"
7"	13"	5"x11"	7"
8"	13"	6"x12"	8"
9"	13"	7"x13"	9"
10"	13"	8"x14"	10"
12"	13"	10"x16"	12"
14"	13"	12"x18"	14"
16"	13"	14"x20"	16"

- MINIMUM 26 GAUGE, G-90 GALVANIZED STEEL
- 1" WIDE MOUNTING FLANGE WITH DIE FORMED CORNER CLIPS
- PRE-PUNCHED MOUNTING HOLES
- ADHESIVE COATED GASKET
- VOLUME DAMPER WITH 2" INSULATION BUILD-OUT AND LOCKING HAND QUADRANT
- BASIS OF DESIGN: FLEXMASTER "STOD"

BEVELED DIFFUSER TAKEOFF FITTING DETAIL | 3

No Scale



NOTES:

1. USE CONICAL BRANCH TAKEOFF FITTING FOR ALL DIFFUSER RUN-OUTS.
2. SPRAY PAINT ALL DAMPER HANDLES ORANGE.

ORDER SIZE "X"	LENGTH W/ DAMPER "H"	CONE DIAMETER "A"	MINIMUM RECTANGULAR DUCT HEIGHT
4"	10"	5 7/8"	6"
5"	10"	6 7/8"	8"
6"	10"	7 7/8"	9"
7"	10"	8 7/8"	10"
8"	10"	9 7/8"	10"
9"	10"	10 7/8"	12"
10"	10"	11 7/8"	14"
12"	10"	13 7/8"	16"
14"	10"	15 7/8"	17"
16"	10"	17 7/8"	18"

- MINIMUM 26 GAUGE, G-90 GALVANIZED STEEL
- VOLUME DAMPER WITH 2" INSULATION BUILD-OUT AND LOCKING HAND QUADRANT
- BASIS OF DESIGN: FLEXMASTER "CB-D"

CONICAL DIFFUSER TAKEOFF FITTING DETAIL | 2

No Scale

OKALOOSA COUNTY

FLY VPS

C19-2811-AP
Construction
of Satellite
Concourse 'C'

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SEAL

Revisions

No.	Date	Description

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Designed By:	OD
Drawn By:	OD
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Issue Date:	30-NOV-2020
Drawing Scale:	12" = 1'-0"

Drawing Title:

MECHANICAL DETAILS

BID DOCUMENTS

Drawing No.:

M410

BIM 360://Design of Satellite Concourse\VPS-MLM_MEP.rvt

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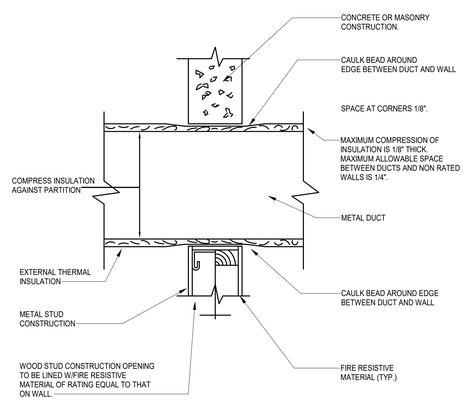
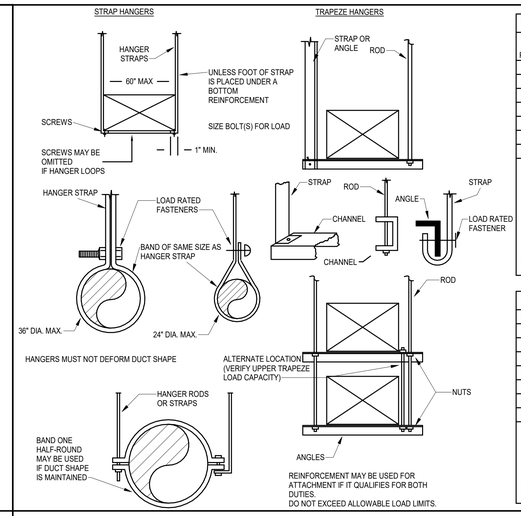


TYP. DUCT PENETRATION FOR NON RATED WALLS | 6

No Scale



RECTANGULAR DUCT HANGER SCHEDULE

MAX. HALF OF DUCT PERIMETER	PAIR AT 10FT SPACING		PAIR AT 8FT SPACING		PAIR AT 5FT SPACING		PAIR AT 4FT SPACING	
	STRAP	ROD	STRAP	ROD	STRAP	ROD	STRAP	ROD
P/2=30"	1"x22 GA	1/4"	1"x22 GA	1/4"	1"x22 GA	1/4"	1"x22 GA	1/4"
P/2=72"	1"x18 GA	3/8"	1"x20 GA	1/4"	1"x22 GA	1/4"	1"x22 GA	1/4"
P/2=96"	1"x16 GA	3/8"	1"x18 GA	3/8"	1"x20 GA	3/8"	1"x22 GA	1/4"
P/2=120"	1.5"x16 GA	1/2"	1"x16 GA	3/8"	1"x18 GA	3/8"	1"x20 GA	1/4"
P/2=168"	1.5"x16 GA	1/2"	1.5"x16 GA	1/2"	1"x16 GA	3/8"	1"x18 GA	3/8"
P/2=192"	N/A	1/2"	1.5"x16 GA	1/2"	1"x16 GA	3/8"	1"x16 GA	3/8"
P/2>192"	SPECIAL ANALYSIS REQUIRED							

NOTES:
1. SCHEDULE CREATED FROM SMACNA "HVAC DUCT CONSTRUCTION STANDARDS", SECOND EDITION - 1995. SMACNA REQUIREMENTS GOVERN.
2. TABLE ALLOWS FOR TYPICAL DUCT WEIGHT WITH NORMAL REINFORCEMENT AND JOINTS, 1 LB/SF INSULATION WEIGHT, AND TRAPEZE WEIGHT, BUT NO EXTERNAL LOADS. IF HEAVIER DUCTS ARE TO BE INSTALLED (SUCH AS DOUBLE-WALL OR DENSE INSULATIONS), ADJUST HANGER SIZES TO BE WITHIN THEIR LOAD LIMITS.
3. STRAPS ARE TO BE GALVANIZED STEEL.
4. ALLOWABLE LOADS FOR P/2 ASSUME THAT DUCTS ARE 16 GA MAX., EXCEPT THAT WHEN MAXIMUM DUCT DIMENSION (W) IS OVER 60", THEN P/2 MAX. IS 1.25W.
5. WIRE IS NOT AN APPROVED HANGER.
6. STRAP AND ROD SIZES ARE MINIMUM ALLOWABLE.
7. FOR UPPER ATTACHMENTS, LOWER ATTACHMENTS, TRAPEZE SIZES, AND ROD/STRAP ALLOWABLE LOADS, SEE SMACNA MANUAL.

ROUND DUCT HANGER SCHEDULE

DIAMETER	MAX. SPACING	ROD	STRAP	
10" & DN	12'	1/4"	1" x 22" GA.	
11"-18"	12'	1/4"	1" x 22" GA.	
19"-24"	12'	1/4"	1" x 22" GA.	
25"-36"	12'	3/8"	1" x 20" GA.	
37"-50"	12'	TWO(2) 3/8"	TWO(2) 1" x 20 GA.	
51"-60"	12'	TWO(2) 3/8"	TWO(2) 1" x 18 GA.	
61"-84"	12'	TWO(2) 3/8"	TWO(2) 1" x 16 GA.	

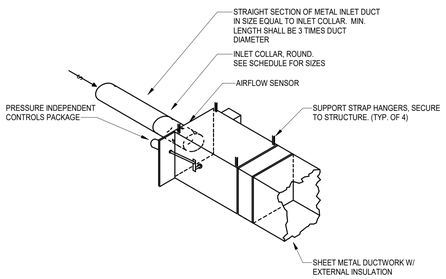
NOTES:
1. SCHEDULE CREATED FROM SMACNA "HVAC DUCT CONSTRUCTION STANDARDS", SECOND EDITION - 1995.
2. TALE ALLOWS FOR CONVENTIONAL WALL THICKNESS, AND JOINT SYSTEMS PLUS 1 LB/SF INSULATION WEIGHT. IF HEAVIER DUCTS ARE TO BE INSTALLED, ADJUST HANGER SIZES TO BE WITHIN THEIR LOAD LIMITS.
3. HANGER SPACING MAY BE ADJUSTED BY SPECIAL ANALYSIS.
4. STRAPS ARE TO BE GALVANIZED STEEL. WIRE IS NOT AN APPROVED HANGER.
5. STRAP AND ROD SIZES ARE MINIMUM ALLOWABLE.
6. FOR UPPER ATTACHMENTS, LOWER ATTACHMENTS, TRAPEZE SIZES, AND ROD/STRAP ALLOWABLE LOADS, SEE SMACNA MANUAL.

LOWER HANGER ATTACHMENTS | 1

No Scale

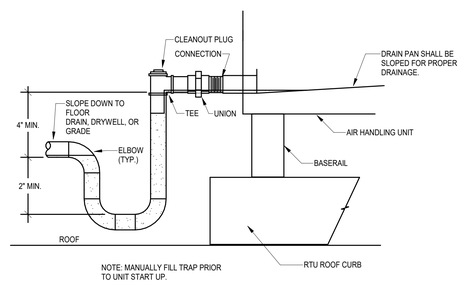
NOT USED | 9

No Scale



VARIABLE VOLUME TERMINAL NO HEATER | 10

No Scale



NOTE: MANUALLY FILL TRAP PRIOR TO UNIT START UP.

DRAW-THRU AHU CONDENSATE DETAIL | 7

No Scale

WIND RESTRAINT REQUIREMENTS:

1. ALL ROOF- AND GROUND-MOUNTED MECHANICAL EQUIPMENT (GRAVITY AND POWERED VENTILATORS, ROOFTOP A/C UNITS, CONDENSING UNITS, FAN EQUIPMENT, ENERGY RECOVERY VENTILATORS, ETC.) SHALL BE FABRICATED TO RESIST THE EFFECTS OF WIND. WIND LOADS SHALL BE BASED ON WIND SPEEDS AS INDICATED IN THE FLORIDA BUILDING CODE 6TH EDITION (2017) AND PER BORA INTERPRETATION - WIND RESISTANCE OF MECHANICAL EQUIPMENT DATED 12-17-2018. DESIGN ROOF- AND GROUND-MOUNTED MECHANICAL EQUIPMENT, INCLUDING COMPREHENSIVE ENGINEERING ANALYSIS BY A QUALIFIED PROFESSIONAL ENGINEER, USING STRUCTURAL AND WIND PERFORMANCE REQUIREMENTS AND DESIGN CRITERIA INDICATED.

2. ALL ROOF- AND GROUND-MOUNTED MECHANICAL EQUIPMENT (GRAVITY AND POWERED VENTILATORS, ROOFTOP A/C UNITS, CONDENSING UNITS, FAN EQUIPMENT, ENERGY RECOVERY VENTILATORS, ETC.) SHALL BE ANCHORED TO RESIST THE EFFECTS OF WIND. WIND LOADS SHALL BE BASED ON ON WIND SPEEDS AS INDICATED IN THE FLORIDA BUILDING CODE 6TH EDITION (2017) AND PER BORA INTERPRETATION - WIND RESISTANCE OF MECHANICAL EQUIPMENT DATED 12-17-2018. DESIGN ROOF- AND GROUND-MOUNTED MECHANICAL EQUIPMENT ANCHORAGE, INCLUDING COMPREHENSIVE ENGINEERING ANALYSIS BY A QUALIFIED PROFESSIONAL ENGINEER, USING STRUCTURAL AND WIND PERFORMANCE REQUIREMENTS AND DESIGN CRITERIA INDICATED. CONTRACTOR SHALL PREPARE WIND-RESTRAINT DETAILS INDICATED TO COMPLY WITH PERFORMANCE REQUIREMENTS AND DESIGN CRITERIA, INCLUDING ANALYSIS DATA SIGNED AND SEALED BY THE QUALIFIED PROFESSIONAL ENGINEER RESPONSIBLE FOR THEIR PREPARATION.

3. DESIGN ANALYSIS AND CALCULATIONS: PROVIDE TO SUPPORT SELECTION AND ARRANGEMENT OF WIND RESTRAINTS. INCLUDE CALCULATIONS OF COMBINED TENSILE AND SHEAR LOADS. PROVIDE REACTIONS AT CONNECTION POINTS TO THE BUILDING STRUCTURE.

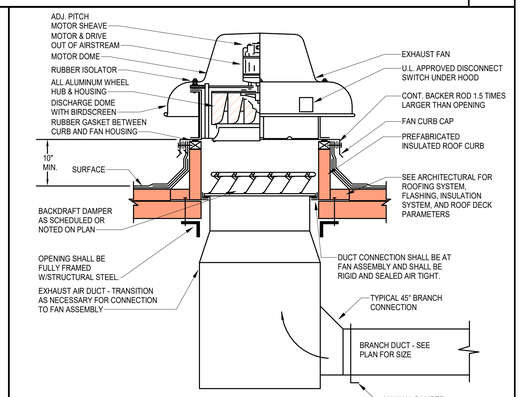
4. FABRICATION AND ARRANGEMENT DETAILS: DETAIL ATTACHMENTS OF RESTRAINTS TO THE RESTRAINED ITEMS AND TO THE STRUCTURE. SHOW ATTACHMENT LOCATIONS, METHODS, AND SPACING. IDENTIFY COMPONENTS, LIST THEIR STRENGTHS, AND INDICATE DIRECTIONS AND VALUES OF FORCES TRANSMITTED TO THE STRUCTURE DURING WIND EVENTS. INCLUDE FABRICATION REQUIREMENTS OF THE EQUIPMENT CURB AND ITS ABILITY TO SUPPORT THE LATERAL LOAD IMPARTED BY THE EQUIPMENT DURING A WIND EVENT.

5. PREAPPROVAL AND EVALUATION DOCUMENTATION: PROVIDE, BY AN AGENCY ACCEPTABLE TO AUTHORITIES HAVING JURISDICTION, SHOWING MAXIMUM RATINGS OF RESTRAINT ITEMS AND THE BASIS FOR APPROVAL (TESTS OR CALCULATIONS).

6. WIND RESTRAINT QUALIFICATION CERTIFICATES: PROVIDE, FROM THE MANUFACTURER, FOR ALL ROOF- AND GROUND-MOUNTED MECHANICAL EQUIPMENT. INCLUDE DIMENSIONED OUTLINE DRAWINGS OF EQUIPMENT UNIT, IDENTIFYING CENTER OF GRAVITY AND LOCATION AND DESCRIPTION OF MOUNTING AND ANCHORAGE PROVISIONS. INCLUDE DETAILED DESCRIPTION OF EQUIPMENT ANCHORAGE DEVICES ON WHICH THE CERTIFICATION IS BASED AND THEIR INSTALLATION REQUIREMENTS.

WIND RESTRAINT REQUIREMENTS | 4

No Scale

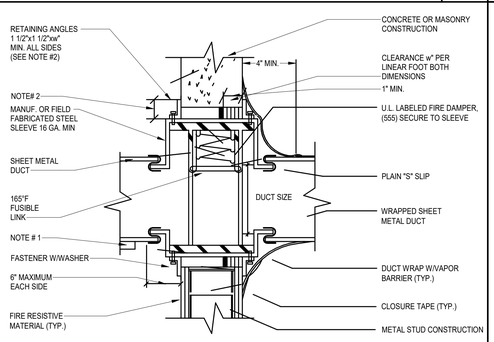


1. SEE "WIND RESTRAINT REQUIREMENTS" ON THIS SHEET AND COMPLY WITH ALL.
2. PROVIDE CERTIFIED HIGH WIND RESISTANT FAN AND CURB ASSEMBLY. CURB AND FAN ASSEMBLY SHALL BE CERTIFIED FOR PERFORMANCE WITHOUT THE USE OF ADDITIONAL CABLE OR GUY-WIRE RESTRAINTS, WHEN CURB IS ANCHORED TO ROOF AND FAN ANCHORED TO CURB IN ACCORDANCE WITH MANUFACTURER'S CERTIFIED INSTALLATION INSTRUCTIONS.
3. ANCHOR PER MANUFACTURER'S CERTIFIED INSTALLATION INSTRUCTIONS. AS A MINIMUM, ANCHOR AS FOLLOWS:

CURB TO STRUCTURAL CONCRETE ROOF DECK - MINIMUM 3/8" BOLTS WITH EXPANSION ANCHORS, AT 12" O.C. (MIN 3 PER SIDE), WITH FENDER WASHERS ON TOP OF SHEETMETAL CURB BASE.
CURB TO METAL DECK - MINIMUM 3/8" BOLTS THRU ROOF ASSEMBLY AND STRUCTURAL STEEL FRAMING ON UNDERSIDE AROUND OPENING, AT 12" O.C. (MIN 3 PER SIDE), WITH FENDER WASHERS ON TOP OF SHEETMETAL CURB BASE.
FAN TO CURB – MINIMUM #12 HEX HEAD SHEETMETAL SCREWS WITH WASHERS, THRU CURB SHEETMETAL ASSEMBLY, SPACED MIN. 9" O.C. (MIN 4 PER SIDE)

ROOFTOP CENTRIFUGAL EXHAUST FAN DETAIL | 2

No Scale



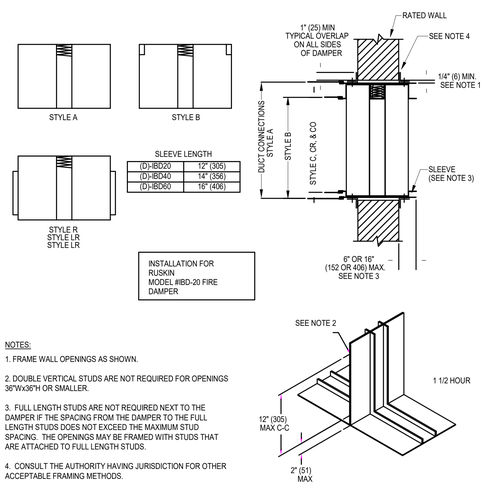
NOTES:
1. PROVIDE ACCESS DOOR & LABEL ON SIDE OR BOTTOM OF DUCT AS FOLLOWS:

DUCT WIDTH	DOOR SIZE
10" THRU 12"	8" x 8"
14" THRU 20"	12" x 12"
22" AND ABOVE	18" x 18"

2. 1"x1"x"w" RETAINING ANGLES SHALL LAP STRUCTURAL OPENING 1" MIN. & COVER CORNERS OF OPENINGS. ANGLES ATTACH TO SLEEVE ONLY AND MUST NOT BE ATTACHED TO EACH OTHER AT CORNERS OR TO WALL.
3. ALL ATTACHMENTS PER MANUFACTURER'S APPROVED INSTALLATION INSTRUCTION.
4. VERTICAL POSITION SHOWN. HORIZONTAL INSTALLATION SIMILAR. DAMPER TO BE SPRING LOADED WHEN HORIZONTAL.

FIRE DAMPER INSTALLATION | 11

No Scale



NOTES:
1. FRAME WALL OPENINGS AS SHOWN.

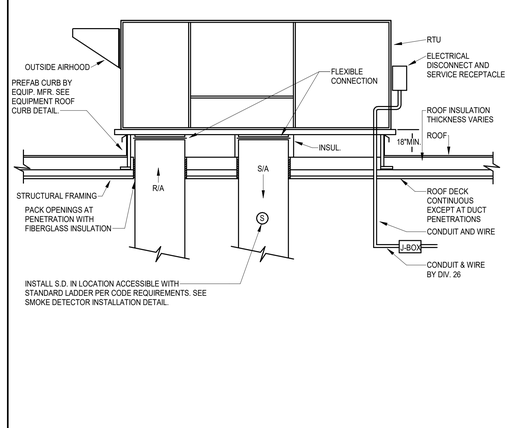
2. DOUBLE VERTICAL STUDS ARE NOT REQUIRED FOR OPENINGS 36"Wx36"H OR SMALLER.

3. FULL LENGTH STUDS ARE NOT REQUIRED NEXT TO THE DAMPER IF THE SPACING FROM THE DAMPER TO THE FULL LENGTH STUDS DOES NOT EXCEED THE MAXIMUM STUD SPACING. THE OPENINGS MAY BE FRAMED WITH STUDS THAT ARE ATTACHED TO FULL LENGTH STUDS.

4. CONSULT THE AUTHORITY HAVING JURISDICTION FOR OTHER ACCEPTABLE FRAMING METHODS.

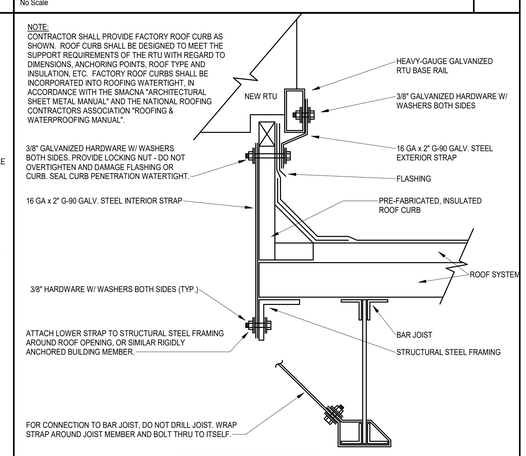
MANUFACTURERS FIRE DAMPER INSTALLATION | 8

No Scale



ROOFTOP UNIT INSTALLATION DETAIL | 5

No Scale



NOTE:
CONTRACTOR SHALL PROVIDE FACTORY ROOF CURB AS SHOWN. ROOF CURB SHALL BE DESIGNED TO MEET THE SUPPORT REQUIREMENTS OF THE RTU WITH REGARD TO DIMENSIONS, ANCHORING POINTS, ROOF TYPE AND INSULATION, ETC. FACTORY ROOF CURBS SHALL BE INCORPORATED INTO ROOFING WATERTIGHT, IN ACCORDANCE WITH THE SMACNA "ARCHITECTURAL SHEET METAL MANUAL" AND THE NATIONAL ROOFING CONTRACTORS ASSOCIATION "ROOFING & WATERPROOFING MANUAL".

NOTE: ALL ROOF MOUNTED EQUIPMENT MUST ADHERE TO CURRENT HURRICANE CODES REGARDING ROOF TIE-IN AND WIND RESISTANCE.

RTU TIE-DOWN DETAIL | 3

No Scale

OKALOOSA COUNTY

FLY VPS

C19-2811-AP
Construction of Satellite Concourse 'C'

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MLM JOB # TYPE PROPERTY

SEAL

Revisions

No.	Date	Description

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Issue Date:	30-NOV-2020
Drawing Scale:	12" = 1'-0"

Drawing Title:

MECHANICAL DETAILS

BID DOCUMENTS

Drawing No.:

M411

BIM 360://Design of Satellite Concourse/VPS-MLM_MEP.rvt
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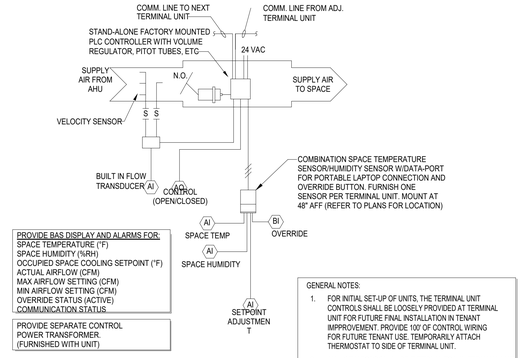


PROVIDE BAS DISPLAY AND ALARMS FOR:
SPACE TEMPERATURE (°F)
SPACE HUMIDITY (%RH)
OCCUPIED SPACE COOLING SETPOINT (°F)
ACTUAL AIRFLOW (CFM)
MAX AIRFLOW SETTING (CFM)
MIN AIRFLOW SETTING (CFM)
OVERRIDE STATUS (ACTIVE)
COMMUNICATION STATUS

PROVIDE SEPARATE CONTROL POWER TRANSFORMER (FURNISHED WITH UNIT)

GENERAL NOTES:

1. FOR INITIAL SET-UP OF UNITS, THE TERMINAL UNIT CONTROLS SHALL BE LOOSELY PROVIDED AT TERMINAL UNIT FOR FUTURE FINAL INSTALLATION IN TENANT IMPPROVEMENT. PROVIDE 100' OF CONTROL WIRING FOR FUTURE TENANT USE. TEMPORARILY ATTACH THERMOSTAT TO SIDE OF TERMINAL UNIT.
2. ALL ACTUATORS SHALL BE EXTERNAL TO VAV TERMINAL UNIT.

CONTROL SEQUENCE: VAV TERMINAL UNITS - NO HEAT

EACH TERMINAL UNIT SHALL BE PRESSURE INDEPENDENT WITH INDEPENDENT COOLING MAXIMUM AND MINIMUM AIRFLOW LIMITS.

EACH TERMINAL UNIT SHALL BE SCHEDULED TO START EACH DAY BASED ON THE RESPECTIVE AHU SCHEDULE. WHEN THE AIR HANDLING UNIT IS "OFF" AND NO AIR FLOW IS SENSED BY THE VAV FLOW TRANSMITTER, THE DAMPER WILL STROKE TO THE FULLY OPEN POSITION. WHEN THE BOX SENSES AIR FLOW AND IS SCHEDULED IN THE UNOCCUPIED STATE, THE DAMPER WILL STROKE TO THE MINIMUM SETTING.

COOLING MODE: THE VAV CONTROLLER WILL STROKE THE DAMPER TO MAINTAIN THE ADJUSTABLE MINIMUM CFM WHILE THE SPACE TEMPERATURE IS 1/2 THE COOLING DEADBAND BELOW THE THERMOSTAT SETPOINT. AS THE SPACE TEMPERATURE RISES FROM 1/2 THE COOLING DEADBAND BELOW THE SETPOINT TO 1/2 THE COOLING DEADBAND ABOVE THE SETPOINT THE CONTROLLER WILL STROKE THE DAMPER AND ADJUST THE AIR FLOW FROM MINIMUM TO MAXIMUM. THE AIR FLOW WILL REMAIN AT MAXIMUM WHEN THE SPACE TEMPERATURE IS 1/2 THE DEADBAND ABOVE THE ADJUSTED SETPOINT.

UNOCCUPIED MODE: THE DDC CONTROLLER SHALL MAINTAIN UNOCCUPIED ADJUSTABLE SETPOINTS OF 80°F COOLING. UPON ACTIVATION OF SPACE OVERRIDE, THE VAV-BOX, ASSOCIATED AHU & SYSTEM SHALL BE COMMANDED TO OCCUPIED MODE FOR 1HR (ADJ.).

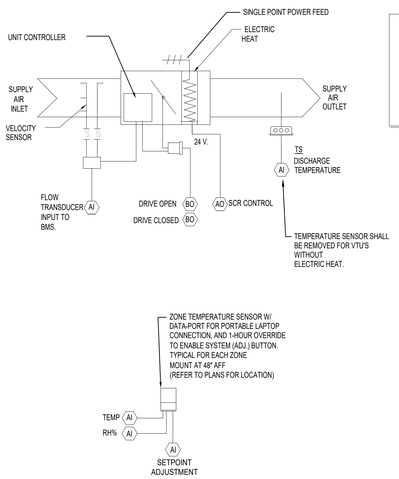
EMERGENCY MODE: UPON ACTIVATION OF THE EMERGENCY AIR DISTRIBUTION SHUT OFF SWITCH, ALL VAV BOXES SHALL MODULATE TO THEIR FULLY CLOSED POSITION.

NOTE: ALL VAV BOX PARAMETERS SHALL BE AVAILABLE AT THE LOCAL THERMOSTAT AND THE GLOBAL KEYPAD/DISPLAY. THE TEST AND BALANCE CONTRACTOR SHALL SET THE MAX CFM, MIN CFM, AND CALIBRATE TO ACTUAL CFM AT THE LOCAL THERMOSTAT.

CONTROL DIAGRAM FOR VAV TERMINAL - NO HEAT | 1

CONTROL DIAGRAM LEGEND

BI	BINARY/DIGITAL INPUT
BO	BINARY/DIGITAL OUTPUT
AI	ANALOG INPUT
AO	ANALOG OUTPUT
	DIFFERENTIAL PRESSURE SWITCH (DPS) OR TRANSMITTER (DPT)
	AVERAGING TEMPERATURE SENSOR
	PROBE TYPE TEMPERATURE SENSOR
	HUMIDITY SENSOR
	TWO-WAY CONTROL VALVE
	DUCT MOUNTED SMOKE DETECTOR
	DAMPER AND ACTUATOR
	STARTER DISCONNECT
	FAN
	AIR FILTER
	WALL-MOUNTED THERMOSTAT/TEMP. SENSOR HUMIDITY SENSOR, CO2 SENSOR, ETC. AS NOTED
NC	NORMALLY CLOSED
NO	NORMALLY OPEN
DX / CC	DIRECT EXPANSION COOLING COIL
	AIRFLOW DIRECTION (BREAK INDICATES SEPARATION FROM AHU.)
	VARIABLE FREQUENCY DRIVE



PROVIDE EMS DISPLAY AND ALARMS FOR:
SPACE TEMPERATURE (°F)
OCCUPIED SPACE COOLING SETPOINT (°F)
OCCUPIED SPACE HEATING SETPOINT (°F)
AIRFLOW (CFM)
MAX AIRFLOW SETTING (CFM)
MIN AIRFLOW SETTING (CFM)
HEATING MIN AIRFLOW SETTING (CFM)
ELECTRIC HEAT OUTPUTS (SCR %)
COMMUNICATION STATUS

24 VOLT CONTROL POWER FOR VAV OPERATOR TO BE OBTAINED FROM A SEPARATE 24 VOLT CONTROLS TRANSFORMER LOCATED IN ELECTRIC HEATER CONTROL CABINET (TO BE FURNISHED WITH TERMINAL UNIT).

WHERE TERMINAL HAS NO ELECTRIC HEATER, PROVIDE SEPARATE CONTROL POWER TRANSFORMER AT CENTRAL LOCATION.

VAV BOX SEQUENCE OF OPERATION

EACH VAV BOX SHALL BE SCHEDULED TO START EACH DAY BASED ON THE RESPECTIVE AHU SCHEDULE. WHEN THE AIR HANDLING UNIT IS "OFF" AND NO AIR FLOW IS SENSED BY THE VAV FLOW TRANSMITTER, THE DAMPER WILL STROKE TO THE FULLY OPEN POSITION. WHEN THE BOX SENSES AIR FLOW AND IS SCHEDULED IN THE UNOCCUPIED STATE, THE DAMPER WILL STROKE CLOSED TO THE MINIMUM SETTING.

ONCE THE VAV BOX IS SCHEDULED IN THE OCCUPIED STATE THEN ALL SEQUENCES SHALL COMMENCE. DURING COOLING OPERATION THE VAV CONTROLLER WILL STROKE THE DAMPER TO MAINTAIN THE ADJUSTABLE MINIMUM CFM WHILE THE SPACE TEMPERATURE IS 1/2 THE COOLING DEADBAND BELOW THE THERMOSTAT SETPOINT. AS THE SPACE TEMPERATURE RISES FROM 1/2 THE COOLING DEADBAND BELOW THE SETPOINT TO 1/2 THE COOLING DEADBAND ABOVE THE SETPOINT THE CONTROLLER WILL STROKE THE DAMPER AND ADJUST THE AIR FLOW FROM MINIMUM TO MAXIMUM. THE AIR FLOW WILL REMAIN AT MAXIMUM FLOW AS LONG AS THE SPACE TEMPERATURE IS 1/2 THE DEADBAND ABOVE THE ADJUSTED SETPOINT.

THE HEATING SETPOINT SHALL BE DETERMINED BY AN ADJUSTABLE DEADBAND BELOW THE COOLING SETPOINT (INITIALLY AT 4°F). THIS WILL BE ADJUSTABLE BY THE BUILDING OPERATOR AT ONE OF THE MAIN SYSTEM GLOBAL KEYPAD/DISPLAYS OR THE VAV GRAPHIC SCREEN. AS THE SPACE TEMPERATURE DROPS BELOW THE DESIRED HEATING SETPOINT THE VAV CONTROLLER SHALL STROKE THE DAMPER TO MAINTAIN THE REHEAT AIR FLOW CFM (ADJ.) AS SCHEDULED. ON A CONTINUED DROP IN SPACE TEMPERATURE THE CONTROLLER SHALL MODULATE THE ELECTRIC HEAT THROUGH THE SCR CONTROLLER AS REQUIRED TO MAINTAIN SPACE TEMPERATURE.

ALL VAV BOX PARAMETERS SHALL BE AVAILABLE AT THE LOCAL THERMOSTAT AND THE GLOBAL KEYPAD/DISPLAY. THE TEST AND BALANCE CONTRACTOR SHALL BE ABLE TO SET MAX CFM, MIN CFM, REHEAT CFM, AND CALIBRATE TO ACTUAL CFM AT THE LOCAL THERMOSTAT.

GENERAL NOTES:

1. FOR INITIAL SET-UP OF UNITS, THE TERMINAL UNIT CONTROLS SHALL BE LOOSELY PROVIDED AT TERMINAL UNIT FOR FUTURE FINAL INSTALLATION IN TENANT IMPPROVEMENT. PROVIDE 100' OF CONTROL WIRING FOR FUTURE TENANT USE. TEMPORARILY ATTACH THERMOSTAT TO SIDE OF TERMINAL UNIT.
2. ALL ACTUATORS SHALL BE EXTERNAL TO VAV TERMINAL UNIT.

CONTROL DIAGRAM FOR VAV TERMINAL UNIT - ELECTRIC HEAT | 4

CONTROL SYSTEM:

A. MANUFACTURERS:
1. SIEMENS
2. TRANE
3. AUTOMATED LOGIC

B. CONTROL SYSTEM SHALL CONSIST OF SENSORS, INDICATORS, ACTUATORS, FINAL CONTROL ELEMENTS, INTERFACE EQUIPMENT, OTHER APPARATUS, AND ACCESSORIES TO CONTROL MECHANICAL SYSTEMS.
C. CONTROL SYSTEM SHALL CONSIST OF SENSORS, INDICATORS, ACTUATORS, FINAL CONTROL ELEMENTS, INTERFACE EQUIPMENT, OTHER APPARATUS, ACCESSORIES, AND SOFTWARE CONNECTED TO DISTRIBUTED CONTROLLERS OPERATING IN MULTIUSER, MULTITASKING ENVIRONMENT ON TOKEN-PASSING NETWORK AND PROGRAMMED TO CONTROL MECHANICAL SYSTEMS. AN OPERATOR WORKSTATION PERMITS INTERFACE WITH THE NETWORK VIA DYNAMIC COLOR GRAPHICS WITH EACH MECHANICAL SYSTEM, BUILDING FLOOR PLAN, AND CONTROL DEVICE DEPICTED BY POINT-AND-CLICK GRAPHICS.
D. THE BAS SHALL BE A WEB-ENABLED SYSTEM WITH A SECURE INTERFACE. A STATIC IP ADDRESS AND CONNECTIVITY WILL BE PROVIDED BY THE OWNER.

BAS EQUIPMENT

CONTROL UNITS: MODULAR, COMPRISING PROCESSOR BOARD WITH PROGRAMMABLE, NONVOLATILE, RANDOM-ACCESS MEMORY; LOCAL OPERATOR ACCESS AND DISPLAY PANEL; INTEGRAL INTERFACE EQUIPMENT; AND BACKUP POWER SOURCE.
1. UNITS MONITOR OR CONTROL EACH I/O POINT; PROCESS INFORMATION; EXECUTE COMMANDS FROM OTHER CONTROL UNITS, DEVICES, AND OPERATOR STATIONS; AND DOWNLOAD FROM OR UPLOAD TO OPERATOR WORKSTATION OR DIAGNOSTIC TERMINAL UNIT.
2. STAND-ALONE MODE CONTROL FUNCTIONS OPERATE REGARDLESS OF NETWORK STATUS. FUNCTIONS INCLUDE THE FOLLOWING:
   A) GLOBAL COMMUNICATIONS.
   B) DISCRETE/DIGITAL, ANALOG, AND PULSE I/O.
   C) MONITORING, CONTROLLING, OR ADDRESSING DATA POINTS.
   D) SOFTWARE APPLICATIONS; SCHEDULING, AND ALARM PROCESSING.
   E) TESTING AND DEVELOPING CONTROL ALGORITHMS WITHOUT DISRUPTING FIELD HARDWARE AND CONTROLLED ENVIRONMENT.
3. STANDARD APPLICATION PROGRAMS:
   A) ELECTRIC CONTROL PROGRAMS: DEMAND LIMITING, DUTY CYCLING, AUTOMATIC TIME SCHEDULING, START/STOP TIME OPTIMIZATION, NIGHT SETBACK/SETUP, ON-OFF CONTROL WITH DIFFERENTIAL SEQUENCING, STAGGERED START, ANTISHORT CYCLING, PID CONTROL, BAS WITH FINE TUNING, AND TREND LOGGING.
   B) HVAC CONTROL PROGRAMS: OPTIMAL RUN TIME, SUPPLY-AIR RESET, AND ENTHALPY SWITCHOVER.
   C) PROGRAMMING APPLICATION FEATURES: INCLUDE TREND POINT; ALARM PROCESSING AND MESSAGING; WEEKLY, MONTHLY, AND ANNUAL SCHEDULING; ENERGY CALCULATIONS; RUN-TIME TOTALIZATION; AND SECURITY ACCESS.
   D) REMOTE COMMUNICATIONS.
   E) MAINTENANCE MANAGEMENT.
   F) UNITS OF MEASURE: INCH-POUND AND SI (METRIC).
4. LOCAL OPERATOR INTERFACE PROVIDES FOR DOWNLOAD FROM OR UPLOAD TO OPERATOR WORKSTATION OR DIAGNOSTIC TERMINAL UNIT.
5. ASHRAE 135 COMPLIANCE: CONTROL UNITS SHALL USE ASHRAE 135 PROTOCOL AND COMMUNICATE USING ISO 8802-3 (ETHERNET) DATALINK/PHYSICAL LAYER PROTOCOL.

C. LOCAL CONTROL UNITS: MODULAR, COMPRISING PROCESSOR BOARD WITH ELECTRONICALLY PROGRAMMABLE, NONVOLATILE, READ-ONLY MEMORY; AND BACKUP POWER SOURCE.
1. UNITS MONITOR OR CONTROL EACH I/O POINT, PROCESS INFORMATION, AND DOWNLOAD FROM OR UPLOAD TO OPERATOR WORKSTATION OR DIAGNOSTIC TERMINAL UNIT.
2. STAND-ALONE MODE CONTROL FUNCTIONS OPERATE REGARDLESS OF NETWORK STATUS. FUNCTIONS INCLUDE THE FOLLOWING:
   A) GLOBAL COMMUNICATIONS.
   B) DISCRETE/DIGITAL, ANALOG, AND PULSE I/O.
   C) MONITORING, CONTROLLING, OR ADDRESSING DATA POINTS.
3. LOCAL OPERATOR INTERFACE PROVIDES FOR DOWNLOAD FROM OR UPLOAD TO OPERATOR WORKSTATION OR DIAGNOSTIC TERMINAL UNIT.
4. ASHRAE 135 COMPLIANCE: CONTROL UNITS SHALL USE ASHRAE 135 PROTOCOL AND COMMUNICATE USING ISO 8802-3 (ETHERNET) DATALINK/PHYSICAL LAYER PROTOCOL.

D. I/O INTERFACE: HARDWIRED INPUTS AND OUTPUTS MAY TIE INTO SYSTEM THROUGH CONTROLLERS. PROTECT POINTS SO THAT SHORTING WILL CAUSE NO DAMAGE TO CONTROLLERS.
1. BINARY INPUTS: ALLOW MONITORING OF ON-OFF SIGNALS WITHOUT EXTERNAL POWER.
2. PULSE ACCUMULATION INPUTS: ACCEPT UP TO 10 PULSES PER SECOND.
3. ANALOG INPUTS: ALLOW MONITORING OF LOW-VOLTAGE (0- TO 10-V DC), CURRENT (4 TO 20 MA), OR RESISTANCE SIGNALS.
4. BINARY OUTPUTS: PROVIDE ON-OFF OR PULSED LOW-VOLTAGE SIGNAL, SELECTABLE FOR NORMALLY OPEN OR NORMALLY CLOSED OPERATION.
5. ANALOG OUTPUTS: PROVIDE MODULATING SIGNAL, EITHER LOW VOLTAGE (0- TO 10-V DC) OR CURRENT (4 TO 20 MA).
6. TRI-STATE OUTPUTS: PROVIDE TWO COORDINATED BINARY OUTPUTS FOR CONTROL OF THREE-POINT, FLOATING-TYPE ELECTRONIC ACTUATORS.
7. UNIVERSAL I/OS: PROVIDE SOFTWARE SELECTABLE BINARY OR ANALOG OUTPUTS.

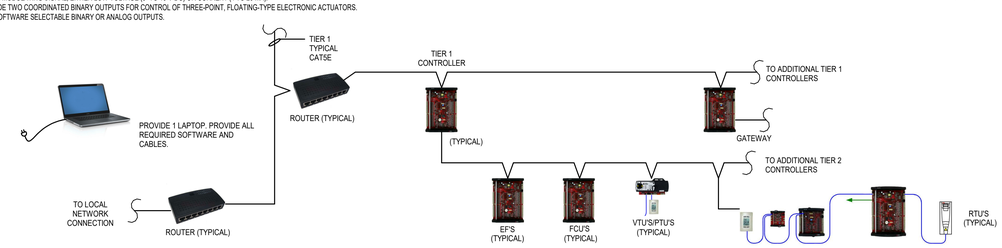
E. POWER SUPPLIES: TRANSFORMERS WITH CLASS 2 CURRENT-LIMITING TYPE OR OVERCURRENT PROTECTION; LIMIT CONNECTED LOADS TO 80 PERCENT OF RATED CAPACITY. DC POWER SUPPLY SHALL MATCH OUTPUT CURRENT AND VOLTAGE REQUIREMENTS AND BE FULL-WAVE RECTIFIER TYPE WITH THE FOLLOWING:
1. OUTPUT RIPPLE OF 5.0 MV MAXIMUM PEAK TO PEAK.
2. COMBINED 1 PERCENT LINE AND LOAD REGULATION WITH 100-MIC.SEC. RESPONSE TIME FOR 50 PERCENT LOAD CHANGES.
3. BUILT-IN OVERVOLTAGE AND OVERCURRENT PROTECTION AND BE ABLE TO WITHSTAND 150 PERCENT OVERLOAD FOR AT LEAST 3 SECONDS WITHOUT FAILURE.

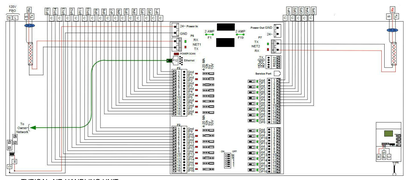
INSTALLATION

A. BUILDING AUTOMATION CONTROLLERS CAN BE ORGANIZED INTO A HIERARCHY STRUCTURE THAT ALLOWS FOR MULTIPLE IP ADDRESSES.
   THE ONLY DEVICES ALLOWED AT THE IP LEVEL SHALL BE THOSE THAT MEET OR EXCEED THE MINIMUM BIBB REQUIREMENTS OF THE LATEST BTL LISTED B-BC CLASS PICS.
1. ALL OTHER DEVICES MUST RESIDE AT A LOWER TIER.
2. ANY DEVICE THAT IS DEPENDENT ON ANOTHER DEVICE FOR EMERGENCY OPERATION, LIFE SAFETY, ETC. MUST HAVE A MEANS OF A DIRECT I/O FOR THE NEEDED POINTS.
   A) RELIANCE ON THE CNL NETWORK BACKBONE IS NOT ACCEPTABLE FOR THESE CONTROL STRATEGIES.
4. ALL INSTALLATIONS SHALL UTILIZE ONE CONTROLLER FOR EACH PIECE OF EQUIPMENT OR SYSTEM. TWO AHU'S CANNOT SHARE A COMMON CONTROLLER.

B. THE FOLLOWING FRAMEWORK SHALL BE UTILIZED FOR DEVICE ADDRESSING (DEVICE INSTANCE) AND NETWORK NUMBER:
1. NETWORK NUMBER SHALL BE COMPRISED OF 3 DIGIT BUILDING NUMBER (551) FOLLOWED BY 2 DIGIT NETWORK NUMBER. IP LEVEL DEVICES SHALL BE ASSIGNED A NETWORK NUMBER OF 1.
2. THE DEVICE ID SHALL BE COMPRISED OF 2 DIGIT NETWORK NUMBER (IP DEVICES USE 00) FOLLOWED BY 2 DIGIT DEVICE NUMBER.
   A) EXAMPLE:
      1) DEVICES ON THE IP LEVEL: 0001-009
      2) MSTP ASSIGNABLE NETWORK NUMBERS: 01-99
      3) MSTP ASSIGNABLE DEVICES: 0101-0199 FOR NETWORK 01
   A) 0201-0299 FOR NETWORK 02
   B) 0301-0399 FOR NETWORK 03CONTINUING TO
   C) 9901-9999 FOR NETWORK 99
      4) MS/TP PHYSICAL ADDRESS SHALL BE SET TO MATCH THE LAST 2-DIGITS OF THE DEVICE ID.

SEE SPECIFICATION SECTION 23 09 00 FOR ADDITIONAL CONTROLS REQUIREMENTS.





TYPICAL AIR HANDLING UNIT CONTROLLER
WIRING AND POINTS SHALL BE BASED ON CONTROL DRAWINGS PROVIDED. DETAIL IS TO SHOW A GENERAL DIAGRAM. CONTRACTOR SHALL PROVIDE A MINIMUM OF 25% ADDITIONAL INPUTS AND OUTPUTS FOR POTENTIAL FUTURE CONTROLS EXPANSION

GENERAL NOTES:

1. FIRE ALARM SYSTEM IS TO BE STAND ALONE FROM BMS. REFER TO FIRE ALARM DRAWINGS FOR REQUIREMENTS.
2. ROUTERS SHOWN ARE TYPICAL AND DIAGRAMATIC, PROVIDE ADDITIONAL ROUTERS FOR A COMPLETE SYSTEM.
3. TIER 1 CONTROLLERS SHOWN ARE TYPICAL AND DIAGRAMMATIC. PROVIDE ADDITIONAL CONTROLLERS IN ACCORDANCE WITH SPECIFICATIONS FOR A COMPLETE SYSTEM.
4. SYSTEM ARCHITECTURE SHALL OPTIMIZE GRAPHIC REFRESH RATES, TO INSURE SPECIFIED NETWORK SPEED AND REFRESH RATES ARE ACHIEVED.
5. TIER 2 CONTROLLERS SHOWN ARE TYPICAL AND DIAGRAMATIC. PROVIDE ADDITIONAL CONTROLLERS AND REPEATERS FOR A COMPLETE SYSTEM.
6. PROVIDE NORMAL 120 VAC POWER WITHOUT UPS BACKUP UNLESS OTHERWISE NOTED.
7. ROUTERS SHALL BE LABLED, LOCATED BELOW CEILING, AND IN MECHANICAL OR IDF ROOMS ONLY.
8. PROVIDE GATEWAY INTERFACES AS REQUIRED FOR A INTEGRATED SYSTEM.

SYSTEM ARCHITECTURE DIAGRAM | 2

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Revisions

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MECHANICAL CONTROLS

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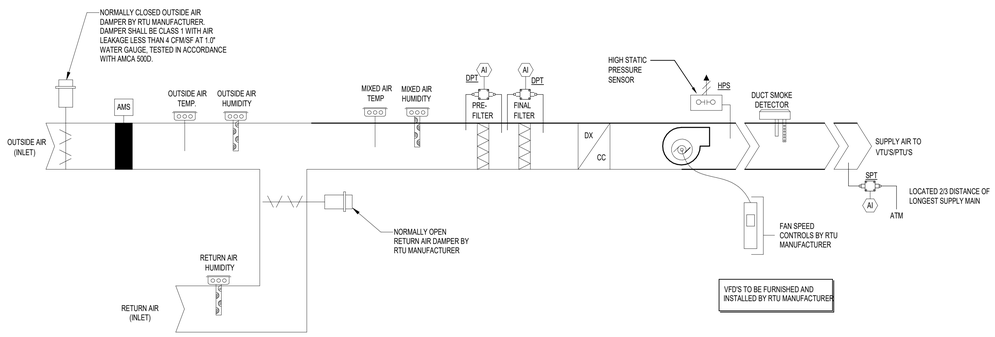


NOTE:
CONTROLS RACEWAY SHALL BE PROVIDE BY ROOFTOP UNIT MANUFACTURER AT THE FACTORY. CONTROLS CONTRACTOR SHALL PROVIDE WIRING WITHIN RACEWAY ONLY. CONTROLS CONTRACTOR SHALL NOT BE PERMITTED TO PROVIDE PENETRATIONS TO ROOFTOP UNIT CASING. CONTROLS CONTRACTOR SHALL NOT BE PERMITTED TO RUN CONTROL WIRING OUTSIDE OF RACEWAY.

PROVIDE BAS DISPLAY AND ALARMS FOR:

- SUPPLY FAN DISABLED (HIGH STATIC) - ALARM
- SUPPLY AIR TEMP (°F) AND SETPOINT
- COMPRESSOR - STATUS (TYPICAL FOR ALL)
- COMPRESSOR - ALARM (TYPICAL FOR ALL)
- CONDENSER FAN - STATUS (TYPICAL FOR ALL)
- MIXED AIR TEMP (°F)
- MIXED AIR HUMIDITY (RH) - BASED ON ENTHALPY CALCULATION
- RETURN AIR HUMIDITY (RH)
- SPACE AIR CO2 (PPM) - SHOWN FOR EACH SENSOR
- SPACE AIR HUMIDITY (RH) - SHOWN FOR EACH SENSOR
- RETURN AIR TEMPERATURE (°F)
- SUPPLY FAN STATIC PRESSURE (IN. W.G.)
- DIFFERENTIAL PRESSURE ACROSS UNIT PRE FILTER (IN. WG.)
- DIFFERENTIAL PRESSURE ACROSS UNIT FINAL FILTER (IN. WG.)
- HIGH UNIT PRE FILTER DIFFERENTIAL PRESSURE ALARM
- HIGH UNIT FINAL FILTER DIFFERENTIAL PRESSURE ALARM
- HIGH OUTSIDE AIR FILTER DIFFERENTIAL PRESSURE ALARM
- RETURN AIRFLOW BY DIFFERENCE BETWEEN SA AND OA (CFM)
- SUPPLY AIRFLOW BY TOTALIZATION OF SA FROM VTUS (CFM)
- VFD STATUS AHU FAN (ON-OFF)
- VFD SPEED COMMAND AHU FAN (HZ/RPM)
- VFD SPEED FEEDBACK AHU FAN (HZ/RPM)
- VFD STATUS EXHUAST FAN (ON-OFF)
- VFD SPEED COMMAND EXHAUST FAN (HZ/RPM)
- VFD SPEED FEEDBACK EXHAUST FAN (HZ/RPM)
- DISPLAY OF ALL ADJUSTABLE POINTS
- DISPLAY OF ALL CONTROL SETPOINTS
- OUTSIDE AIR INLET FLOW (CFM)
- OUTSIDE AIR INLET HUMIDITY (RH)
- OUTSIDE AIR INLET TEMP (°F)
- OUTSIDE AIR AIRFLOW 10% BELOW SETPOINT (OCCUPIED PERIODS ONLY) - ALARM
- OUTSIDE AIR DAMPER POSITION - % OPEN
- RETURN AIR DAMPER POSITION - % OPEN

DX VAV RTU CONTROL SEQUENCE

GENERAL: THE SYSTEM CONSISTS OF A VARIABLE AIR VOLUME PACKAGED-DX UNIT (RTU), FULLY MODULATING OA DAMPER AND RA DAMPER, AIR FLOW MEASUREMENT STATIONS, POWERED EXHAUST, DUCT SMOKE DETECTOR(S), AND COMPRESSORS. RTU SHALL BE PROVIDED WITH A BAS INTEGRATION CARD FOR FULL BAS INTERFACE VIA BACNET. THE UNIT GRAPHIC SHALL INDICATE ALL POINTS AS INDICATED ON THE CONTROL DIAGRAM AS A MINIMUM. GRAPHICS SHALL ALSO INCLUDE ALL AVAILABLE INPUTS/OUTPUTS AND ALARMS AVAILABLE FROM THE AIR HANDLING UNIT BACNET CARD. THE DX SYSTEM FACTORY CONTROLS SHALL CONTROL COMPRESSOR OPERATION AND STAGING, SUPPLY FAN SPEED TO MAINTAIN DUCT STATIC PRESSURE DIFFERENTIAL. THE RTU SHALL BE CONTROLLED ON A SEVEN-DAY TIME SCHEDULE AUTOMATICALLY THROUGH THE FRONT END BAS. THE UNIT SHALL COOL, DEHUMIDIFY, STAGE COMPRESSORS, MODULATE THE SUPPLY AIR FAN AND OUTSIDE AIR DAMPER, ETC. UTILIZING FACTORY CONTROLS.

MODES OF OPERATION:

OCCUPIED MODE: THE BAS SHALL COMMAND THE UNIT TO OCCUPIED MODE BASED ON SCHEDULE. UPON COMMAND TO OCCUPIED MODE, ACTIVATE RTU AND ENABLE THE FOLLOWING:

- UPON ACTIVATION OF RTU, ACTIVATE ALL INTERLOCKED EXHAUST FANS.

-MAINTAIN SUPPLY AIR DUCT STATIC PRESSURE SETPOINT (AS DETERMINED BY TEST & BALANCE FOR PROPER BALANCE). DUCT STATIC PRESSURE SETPOINT SHALL RESET BASED ON THE STATIC PRESSURE RESET SEQUENCE BELOW.

-MAINTAIN 54 DEG F (ADJ.) DISCHARGE AIR TEMPERATURE SETPOINT UPON INITIAL UNIT ACTIVATION. DISCHARGE AIR TEMPERATURE SETPOINT SHALL RESET BASED ON THE DISCHARGE AIR TEMPERATURE RESET SEQUENCE BELOW.

-MODULATE OA DAMPER TO MAINTAIN OUTSIDE AIR SETPOINT AS DETERMINED BY THE DEMAND CONTROL VENTILATION (DCV) SEQUENCE. IF OUTSIDE AIR DAMPER IS 100% OPEN AND OA FLOW IS LESS THAN SETPOINT, SLOWLY MODULATE RETURN AIR DAMPER FROM THE OPEN POSITION TOWARD THE CLOSED POSITION TO MAINTAIN OUTSIDE AIR SETPOINT (PROVIDE RETURN AIR DAMPER MINIMUM POSITION LIMIT OF 30% (ADJ.) TO ENSURE RETURN AIR DAMPER DOES NOT CLOSE).

- IF ANY ZONE RH% EXCEEDS 60% (ADJ.), ENABLE DEHUMIDIFICATION MODE.

UNOCCUPIED MODE: THE BAS SHALL COMMAND THE UNIT TO UNCCUPIED MODE BASED ON SCHEDULE. UPON COMMAND TO UNOCCUPIED MODE, ENABLE THE FOLLOWING:

- DISABLE ALL INTERLOCKED EXHAUST FANS.

- OUTSIDE AIR DAMPERS SHALL BE COMMANDED 100% CLOSED, RETURN AIR DAMPERS SHALL BE COMMANDED 100% OPEN.

IF A SINGLE ZONE CALLS FOR UNOCCUPIED COOLING, ASSOCIATED RTU SHALL BE ENABLED. IN UNOCCUPIED COOLING MAINTAIN THE FOLLOWING:

-MAINTAIN SUPPLY AIR DUCT STATIC PRESSURE SETPOINT (AS DETERMINED BY TEST & BALANCE FOR PROPER BALANCE).

-MAINTAIN 54 DEG F (ADJ.) DISCHARGE AIR TEMPERATURE SETPOINT.

- IF ANY ZONE RH% EXCEEDS 60% (ADJ.), ENABLE DEHUMIDIFICATION MODE.

DEHUMIDIFICATION MODE:
DISABLE DISCHARGE AIR TEMPERATURE RESET SEQUENCE AND RESET DISCHARGE AIR TEMPERATURE SETPOINT TO 54 DEG F (ADJ). ONCE ALL SPACE HUMIDITY SENSORS ARE AT LEAST 5% RH BELOW HIGH LIMIT HUMIDITY SETPOINT OF 60% (ADJ.), THEN DISABLE DEHUMIDIFICATION MODE AND ALLOW SUPPLY AIR TEMPERATURE RESET SEQUENCE TO OPERATE STARTING AT 53 °F (ADJ.).

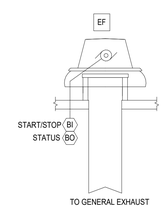
RESET REQUENCES:

DISCHARGE AIR TEMPERATURE RESET SEQUENCE:
PROVIDE A DISCHARGE AIR TEMPERATURE RESET MODE THAT WILL GRADUALLY INCREASE THE DISCHARGE AIR TEMPERATURE (59°F MAXIMUM, AS MEASURED VIA THE FACTORY PROVIDED DISCHARGE AIR TEMPERATURE SENSOR) WHENEVER ALL OF THE FOLLOWING ARE TRUE: A VAV TERMINAL UNIT IS CALLING FOR HEAT; NO OTHER VAV TERMINAL UNIT IS REQUIRING 90% OR GREATER COOLING AIRFLOW; AND THE SPACE AIR RELATIVE HUMIDITY (AS SENSED BY THE SPACE HUMIDITY SENSOR) IS 55% RH OR LESS. IF THE HUMIDITY RISES TO 60% OR GREATER, ENABLE DEHUMIDIFICATION MODE.

STATIC PRESSURE RESET SEQUENCE:
BAS SHALL POLL THE DAMPER POSITION OF ALL VAV TERMINAL UNITS. IF ALL DAMPERS ARE BELOW 70% (ADJ) AS INDICATED BY COMMAND SIGNAL, THE BAS SHALL RESET THE STATIC PRESSURE SET-POINT DOWN AT A RATE OF -0.1 IN W.G. IF ANY VAV BOX DAMPER COMMAND SIGNAL IS ABOVE 98%, THE BAS SHALL RESET STATIC PRESSURE SET-POINT UP AT A RATE OF +0.1 IN W.G. THE BAS SHALL POLL ALL AIR TERMINALS CONTINUOUSLY AND LIMIT RESET FREQUENCY TO EVERY 5 MINUTES.

SAFETIES: ACTIVATION OF THE DUCT SMOKE DETECTOR(S) OR HPS SHALL AUTOMATICALLY SHUT DOWN THE AHU FANS. THESE SAFETIES SHALL BE HARD WIRED INTERLOCKED WITH THE FAN WHEN OPERATING THROUGH THE DDC CONTROLLER OR BYPASS CONTACTOR.

CONTROL DIAGRAM FOR PACKAGED ROOFTOP VAV UNIT (RTU-1, RTU-2, RTU-3, RTU-4, RTU-5. RTU-6) | 1



EXHAUST SYSTEM CONTROL SEQUENCE

GENERAL: THE SYSTEM CONSISTS OF A CONSTANT VOLUME EXHAUST FAN.

SEQUENCE: THE BAS SHALL COMMAND THE EXHAUST FAN TO ACTIVATE BASED ON AN INTERLOCK TO THE RESPECTIVE RTU. REFER TO THE EXHAUST FAN INTERLOCK SCHEDULE.

SAFETIES: ACTIVATION OF THE DUCT SMOKE DETECTOR(S) AT THE RESPECTIVE INTERLOCKED RTU SHALL AUTOMATICALLY SHUT DOWN THE EXHAUST FAN. THESE SAFETIES SHALL BE HARD WIRED INTERLOCKED WITH THE FAN WHEN OPERATING THROUGH THE DDC CONTROLLER OR BYPASS CONTACTOR.

EXHAUST FAN INTERLOCK SCHEDULE	
EF-1	RTU-1
EF-2	RTU-2
EF-3	RTU-5

GENERAL EXHAUST FAN CONTROL DIAGRAM | 2

CONTROL DIAGRAM LEGEND

- BI — BINARY/DIGITAL INPUT
- BO — BINARY/DIGITAL OUTPUT
- AI — ANALOG INPUT
- AO — ANALOG OUTPUT
- DIFFERENTIAL PRESSURE SWITCH (DPS) OR TRANSMITTER (DPT)
- AVERAGING TEMPERATURE SENSOR
- PROBE TYPE TEMPERATURE SENSOR
- HUMIDITY SENSOR
- TWO-WAY CONTROL VALVE
- DUCT MOUNTED SMOKE DETECTOR
- DAMPER AND ACTUATOR
- STARTER DISCONNECT
- FAN
- AIR FILTER
- WALL-MOUNTED THERMOSTAT/TEMP. SENSOR HUMIDITY SENSOR, CO2 SENSOR, ETC. AS NOTED
- NC — NORMALLY CLOSED
- NO — NORMALLY OPEN
- DX / CC — DIRECT EXPANSION COOLING COIL
- AIRFLOW DIRECTION (BREAK INDICATES SEPARATION FROM AHU.)
- VARIABLE FREQUENCY DRIVE

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PLUMBING FIXTURE SCHEDULE

MARK	FIXTURE TYPE	FIXTURE MANUFACTURER	FIXTURE MODEL	TRIM MANUFACTURER	TRIM MODEL	FLOW RATE / FLUSH RATE / FLOW CYCLE	DESCRIPTION / SPECIFICATIONS
	WATER CLOSET (ACCESSIBLE)	AMERICAN STANDARD	3351.001				
WC-1	WATER CLOSET	AMERICAN STANDARD	3351.101	SLOAN	111-1.6/1.1	1.6/1.1 GPF	WALL MOUNTED FLUSHOMETER VALVE TYPE, 15" HIGH, VITREOUS CHINA, DUAL FLUSH (1.6 / 1.1 GPF), WITH SIPHON JETTED ELONGATED BOWL. REFER TO NOTES BELOW FOR ADDITIONAL REQUIREMENTS.
UR-2	URINAL (ACCESSIBLE)	AMERICAN STANDARD	6501.010	SLOAN	ECOS 8186	1.0 GPF	WALL HUNG VITREOUS CHINA, 1.0 GPF, SIPHON JET URINAL WITH INTEGRAL FLUSHING RIM, INTEGRAL TRAP, AND 2" FEMALE FLANGED OUTLET CONNECTION. REFER TO NOTES BELOW FOR ADDITIONAL REQUIREMENTS.
L-2	LAVATORY (ACCESSIBLE)	AMERICAN STANDARD	0356.015	DELTA COMMERCIAL	590T0151TR-B B	1.5 GPM	WALL HUNG VITREOUS CHINA FOR CONCEALED ARMS SUPPORT, 20" X 18", PROVIDE WITH GOOSENECK SPOUT FAUCET MOUNTED ON 8" CENTERS, WITH WRIST BLADE HANDLES AND LAMINAR FLOW AERATOR. REFER TO NOTES BELOW FOR ADDITIONAL REQUIREMENTS.
L-1	SELF-RIMMING LAVATORY	AMERICAN STANDARD	0476.028	DELTA COMMERCIAL	590T0151TR-B B	0.5 GPM	VITREOUS CHINA, 20" X 17" OVAL, PUNCHED FOR 4" CENTERSET FITTING. PROVIDE WITH SINGLE LEVER CAST BRASS FAUCET WITH VANDAL RESISTANT OUTLET. REFER TO NOTES BELOW FOR ADDITIONAL REQUIREMENTS.
MS-1	MOP SINK	STERN-WILLIAMS	SB-900-BP	T & S BRASS	B-0665-BSTP	2.5 GPM	FLOOR MOUNTED PRECAST TERRAZO WITH STAINLESS STEEL CAP, 24"x24"x12", DRAIN BODY SHALL BE STAINLESS STEEL CAST INTEGRAL, AND SHALL PROVIDE FOR A CAULKED LEAD CONNECTION AND NOT LESS THAN 1" DEEP TO A 3" PIPE. REFER TO NOTES BELOW FOR ADDITIONAL REQUIREMENTS.
EWC-1	ELECTRIC WATER COOLER	ELKAY	LRPBM28K	N/A	N/A	7.5 GPH	TYPE 304 18-8 STAINLESS STEEL TWO-LEVEL WHEELCHAIR ACCESSIBLE WATER COOLER WITH RECESSED REFRIGERATION SYSTEM, WATER SENTRY FILTER SYSTEM AND STAINLESS STEEL WALL GRILL. CONTOURED BASIN RECESSED INTO STAINLESS STEEL TUBULAR SUPPORT ARM. RATED AT 7.5 GPH, 5 FULL LOAD AMPS, 575 WATTS, 115 VOLTS, AND WEIGHTS 140 LBS.
FD-1	FLOOR DRAIN	WATTS	FD-1200-A	N/A	N/A	N/A	EPOXY COATED CAST IRON BODY WITH ANCHOR FLANGE, WEEPHOLES, ADJUSTABLE ROUND STAINLESS STEEL STRAINER, NO-HUB OUTLET, AND TRAP PRIMER CONNECTION.
RD-1	COMBINED LARGE SUMP ROOF DRAIN AND SECONDARY OVERFLOW DRAIN	WATTS	RD-700	N/A	N/A	N/A	EPOXY COATED CAST IRON DUAL OUTLET ROOF DRAIN/OVERFLOW COMBINATION WITH FLASHING CLAMP, INTEGRAL GRAVEL STOP, 4" HIGH INTERNAL OVERFLOW STANDPIPE SECURED DUCTILE IRON DOME, AND NO HUB OUTLETS. SEE PLANS FOR OUTLET SIZES REQUIRED.
TD-1	TRENCH DRAIN (SLAB-ON-GRADE)	ZURN	Z882- HDS	N/A	N/A	N/A	OPTIONS U4 NO HUB BOTTOM OUTLET, HPDE HEEL PROOF DUCTILE SLOTTED GRATE-CLASS E, ADA-USA, VP VALDAL PROOF LOCKDOWN.
WH-1	WALL HYDRANT IN LOCKED BOX	WOODFORD	B65	N/A	N/A	N/A	FREEZE PROOF ENCLOSED WALL ANTI-SIPHON WALL HYDRANT COMPLETE WITH BRONZE CASING, VACUUM BREAKER, ALL BRONZE INTERIOR PARTS AND NON TURNING OPERATING ROD WITH FREE FLOATING COMPRESSION CLOSURE VALVE. WATER BOX DOOR SHALL BE BRASS CASTING WITH CHROME FINISH AND OPERATING KEY.
WH-2	WALL HYDRANT	WOODFORD	24P-3/4	N/A	N/A	N/A	ANTI-SIPHON VACCUMM BREAKER PROTECTED WALL HYDRANT WITH LOOSE KEY HANDLE.

NOTES:

1. WATER CLOSET HARDWARE:

   TOILET SEAT - BEMIS No. 1655SS, EXTRA HEAVY SOLID PLASTIC WITH STAINLESS STEEL SELF SUSTAINING CHECK HINGE. OPEN FRONT WITHOUT COVER.
   FIXTURE CARRIER - WATTS ISCA-102-LR, EXTRA-HEAVY DUTY (1,000 lbs) BARIATRIC CARRIER COMPLIANT WITH ASME A112.6.1M, SINGLE VERTICAL THIN WALL WATER CLOSET CARRIER WITH EPOXY COATED CAST IRON FITTING, NO HUB WASTE (3"), AND VENT (2") CONNECTIONS, EPOXY COATED CAST IRON PATENTED COMPRESSION SEAL FACE PLATE ASSEMBLY, EPOXY COATED CAST IRON FOOT SUPPORTS ADJUSTABLE FOR STANDARD AND WHEELCHAIR HEIGHT, ADJUSTABLE ABS NIPPLE WITH INTEGRAL TEST CAP AND NEOPRANE BOWL GASKET, PLATED HARDWARE AND CHROME CAP NUTS.

2. URINAL HARDWARE:

   FIXTURE CARRIER - WATTS No. CA-321, FULLY ADJUSTABLE URINAL CARRIER WITH HEAVY GAUGE STEEL OFFSET UPRIGHTS, ADJUSTED TO ACCESSIBLE HEIGHT.

3. LAVATORY HARDWARE:

   STRAINER/TRAP - McGUIRE No. 155A/8902, CHROME PLATED STRAINER, CAST GRID STRAINER WITH 1-1/4" TAILPIECE, PLATED 17 GAUGE 1-1/4" X 1-1/2" BRASS P-TRAP WITH CLEANOUT. (ADA DEPTH SINKS SHALL HAVE OFFSET TAILPIECES McGUIRE No. 155WC/8902).
   SUPPLIES - McGUIRE No. 2165CC, 1/2" COMPRESSION X 3/8" COMPRESSION CHROME PLATED ANGLE SUPPLY STOPS WITH CHROME PLATED 12" FLEXIBLE RISERS AND ESCUTCHEONS.
   INSULATION KIT - EXPOSED SUPPLIES AND TRAPS ARE TO BE PROTECTED WITH INSULATION KITS EQUAL TO PLUMBEREX No. 4333.
   FIXTURE CARRIER - WATTS No. WCA-411, CONCEALED ARMS FLOOR MOUNTED CARRIER COATED STEEL UPRIGHTS WITH WELDED FEET, CAST IRON ADJUSTABLE HEADERS, STEEL SLEEVES, ALIGNMENT TRUSS AND FASTENERS.

4. SINK HARDWARE:

   TRAP - McGUIRE No. 8912, CHROME PLATED 17 GAUGE 1-1/2" X 1-1/2" BRASS P-TRAP WITH CLEANOUT. (ADA DEPTH SINKS SHALL HAVE OFFSET TAILPIECES McGUIRE No. 155WC/8902).
   SUPPLIES - McGUIRE No. 2165CC, 1/2" COMPRESSION X 3/8" COMPRESSION CHROME PLATED ANGLE SUPPLY STOPS WITH CHROME PLATED 12" FLEXIBLE RISERS AND ESCUTCHEONS.

5. MOP SINK HARDWARE:

   HOSE AND WALL HOOK - STERN WILLIAMS No. T-35, 36" LONG HOSE AND STAINLESS STEEL WALL BRACKET.

6. SHOWER HARDWARE:

   DRAIN - WATTS No. FD-1100-L, EPOXY COATED CAST IRON SHOWER DRAIN WITH ANCHOR FLANGE, REVERSIBLE CLAMPING COLLAR WITH PRIMARY AND SECONDARY WEEPHOLES, ADJUSTABLE HEAVY DUTY SQUARE HEEL PROOF STAINLESS STEEL STRAINER.

7. ELECTRIC WATER COOLER / DRINKING FOUNTAIN HARDWARE:

   FIXTURE CARRIER - WATTS No. CA-431-1, FLOOR MOUNTED BI-LEVEL WATER COOLER CARRIER WITH HEAVY GAUGE STEEL UPRIGHTS WITH INTEGRAL WELDED FEET, UNIVERSAL STEEL HANGER SUPPORT PLATE, AND PLATED HARDWARE.

EWH-1
ELECTRIC WATER HEATER

A.O. SMITH
MODEL# DEN-40
480V 3 PHASE 4.5KW 60HZ
DIMENSIONS: 45-1/8" x 20-1/2"

EWH-2
ELECTRIC TANKLESS WATER HEATER

EEMAX
MODEL# EX4277T
277V 1 PHASE 4.1KW 14.8A 60HZ
DIMENSIONS: 10-3/4" x 5-1/4" x 2-3/4"

CP-1
HOT WATER CIRCULATING PUMP

TACO
MODEL# 005-SF2
115V 1 PHASE 1/35 HP .52 APMS 60HZ

OS-1
OVER FLOW DOWN SPOUT

ZURN
MODEL# ZF199
OPTIONS: MEDIUM BRONZE

CO

CLEANOUTS

GENERAL (ALL FLOOR CLEANOUTS): DURA-COATED CAST IRON CLEANOUT WITH MEMBRANE FLANGE WITH CADMIUM PLATED CAST IRON COUNTERSUNK PLUG. CLEANOUT CAN BE ADJUSTED TO FINISH FLOOR LEVEL AFTER CONCRETE HAS SET.

FLOOR: HEAVY DUTY ROUND SCORIATED NICKEL BRONZE TOP

CARPETED FLOOR: HEAVY DUTY ROUND NICKEL BRONZE TOP RECESSED FOR CARPET.

TILE FLOOR: HEAVY DUTY ROUND NICKEL BRONZE TOP RECESSED FOR TILE.

EXTERIOR: HEAVY DUTY ROUND SCORIATED NICKEL BRONZE TOP. PROVIDE WITH 18" X 4" THICK CONCRETE COLLAR, SEE DETAIL.

WALL: CAST IRON CLEANOUT TEE, CADMIUM PLATED CAST IRON COUNTERSUNK PLUG, SMOOTH SQUARE NICKEL BRONZE WALL ACCESS COVER AND FRAME.

PLUG: DURA-COATED CAST IRON FERRULE AND CADMIUM PLATED CAST IRON COUNTERSUNK PLUG.

BASIS OF DESIGN

FLOOR - ZURN - ZN1405
CARPETED FLOOR - ZURN - ZN1405
TILE FLOOR - ZURN - ZN1405
EXTERIOR FLOOR - ZURN - ZN1406
WALL - ZURN - Z1445
PLUG - ZURN - Z1440

PLUMBING SYMBOLS

SYMBOL	DESCRIPTION
CD	CONDENSATE DRAIN PIPING
CW	DOMESTIC COLD WATER PIPING
HW	DOMESTIC HOT WATER PIPING
HWR	DOMESTIC HOT WATER RETURN PIPING
S	SANITARY WASTE PIPING
V	VENT PIPING
ST	STORM DRAIN PIPING
STO	OVERFLOW STORM DRAIN PIPING
G	FUEL GAS PIPING
	HOSE BIBB OR WALL HYDRANT
CO	CLEANOUT PLUG
CO	WALL CLEANOUT
CO	FLOOR CLEANOUT / EXTERIOR CLEANOUT
FD	FLOOR DRAIN
FS	FLOOR SINK
DD	DECK DRAIN
	SHUT-OFF VALVE
	BALL VALVE
	CALIBRATED BALANCING VALVE
	CHECK VALVE (SWING)
	PRESSURE REDUCING VALVE
S	SOLENOID OPERATING VALVE
	GAS COCK
	GAS PRESSURE REGULATOR
4 P4.101 (DETAIL No. / SHEET No. SHOWN ON)	DETAIL REFERENCE
4" S (PIPE SIZE / PLUMBING SYSTEM)	PIPE TAG
1	REVISION REFERENCE

PLUMBING ABBREVIATIONS

ABBREVIATION	DESCRIPTION
CA	COMPRESSED AIR
AFF	ABOVE FINISH FLOOR
AW	ACID WASTE
AV	ACID VENT
CB	CATCH BASIN
CD	CONDENSATE DRAIN
CFH	CUBIC FEET PER HOUR
CO	CLEANOUT
CONT	CONTINUATION
CW	DOMESTIC COLD WATER
DI	DEIONIZED WATER
DN	DOWN
DS	DOWNSPOUT
DWG	DRAWING
EXIST	EXISTING
°F	DEGREE FAHRENHEIT
FCO	FLOOR CLEANOUT
FD	FLOOR DRAIN
FOF	FUEL OIL FILL
FOG	FUEL OIL GAGE
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
FOV	FUEL OIL VENT
FS	FLOOR SINK
FSE#	FOODSERVICE EQUIPMENT NUMBER
G	GAS
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GR	KITCHEN WASTE (GREASE)
HB	HOSE BIBB
HD	HUB DRAIN
HW	DOMESTIC HOT WATER
HWR	DOMESTIC HOT WATER RECIRCULATING
IE	INVERT ELEVATION
IW	INDIRECT WASTE
KW	KILOWATT
LBS	POUNDS
MH	MANHOLE
NC	NORMALLY CLOSED
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NP	NON-POTABLE WATER
NTS	NOT TO SCALE
OD	OUTSIDE DIAMETER
PRV	PRESSURE REDUCING VALVE
PSI	POUNDS PER SQUARE INCH
PVC	POLYVINYL CHLORIDE PIPE
RD	ROOF DRAIN
RPBP	REDUCED PRESSURE BACKFLOW PREVENTOR
SAN	SANITARY
SD	STORM DRAIN
SF	SQUARE FEET
SH	SHEET
ST	STORM
STO	OVERFLOW STORM DRAIN
SW	SOFT COLD WATER
V	VENT
VAC	VACUUM
VC	VACUUM CLEANING
VTR	VENT THRU ROOF
WCO	WALL CLEANOUT
WTR	WATER

NOTE: SOME SYMBOLS SHOWN ON THIS LEGEND MAY NOT PERTAIN TO THIS PROJECT

PLUMBING GENERAL NOTES

1. REFERENCE THE SPECIFICATIONS FOR MATERIAL AND EQUIPMENT INSTALLATION STANDARDS.
2. THE PLUMBING INSTALLATION SHALL COMPLY WITH ALL STATE AND LOCAL CODES.
3. UTILITIES AND SERVICES INDICATED ARE TAKEN FROM VARIOUS OLD AND NEW SURVEYS, AS-BUILT RECORDS AND FIELD INVESTIGATIONS. UNFORSEEN CONDITIONS PROBABLY EXIST AND NEW WORK MAY NOT BE FIELD LOCATED EXACTLY AS SHOWN ON DRAWINGS. COOPERATION WITH OTHER TRADES IN ROUTING AND BURIAL DEPTHS, AS DETERMINED DURING CONSTRUCTION, WILL BE NECESSARY.
4. FIELD VERIFY EXISTING INSTALLATIONS. MODIFY EXISTING PLUMBING SYSTEMS, WHICH ARE TO REMAIN ACTIVE, TO FACILITATE RECONNECTION AND EXTENSION OF THE NEW WORK.
5. NOTIFY OWNER AT LEAST 24 HOURS PRIOR TO INTERRUPTING EXISTING SERVICE. SCHEDULE DISCONNECTION AND TIE-INS TO MINIMIZE DISRUPTION OF SERVICES. SERVICES ARE NOT TO BE LEFT DISRUPTED DURING NON-NORMAL CONTRACTOR WORKING HOURS.
6. PLANS ARE NOT COMPLETELY TO SCALE. PIPE ROUTING SHOWN IS SCHEMATIC AND IS NOT INTENDED TO INDICATE EXACT ROUTING. CONTRACTOR SHALL PROVIDE ANY ADDITIONAL OFFSETS AND FITTINGS REQUIRED FOR PROPER INSTALLATION AND TO MAINTAIN CLEARANCES. VERIFY STRUCTURAL, MECHANICAL AND ELECTRICAL INSTALLATIONS AND OTHER POTENTIAL OBSTRUCTIONS AND ROUTE PIPING TO AVOID INTERFERENCES.
7. PROVIDE ALL OFFSETS AND FITTINGS AND MAKE CONNECTION TO SITE UTILITIES.
8. CONCEAL PIPING ABOVE CEILINGS, WITHIN WALLS OR CHASES EXCEPT IN MECHANICAL ROOMS OR AS SPECIFICALLY NOTED.
9. PROVIDE ACCESS PANELS FOR ALL VALVES CONCEALED IN WALLS OR ABOVE NON-ACCESSIBLE CEILINGS.
10. SLEEVE AND/OR FIRESTOP ALL PENETRATIONS THROUGH RATED WALLS, CEILINGS, AND FLOORS WITH U/L LISTED ASSEMBLIES. FIRESTOP ASSEMBLIES SHALL BE EQUAL TO OR EXCEED THE RATING OF THE WALL, CEILING OR FLOOR. SEE ARCHITECTURAL DRAWINGS FOR FINAL FINISHES.
11. FLASH AND COUNTER-FLASH ROOF PENETRATIONS.
12. WHEN BEAM SLEEVE PENETRATIONS ARE NECESSARY, COORDINATE PENETRATIONS WITH ALL TRADES, THE ARCHITECT AND THE STRUCTURAL ENGINEER.
13. PROVIDE FOUNDATION PAD PENETRATION SLEEVES. ALLOW 1" MINIMUM CLEARANCE BETWEEN SLEEVE INSIDE SURFACE AND PIPE EXTERIOR.
14. SEE ARCHITECTURAL DRAWINGS FOR FIXTURE LOCATIONS AND MOUNTING HEIGHTS.
15. PROVIDE AUTOMATIC TRAP PRIMERS FOR FLOOR DRAIN TRAP SEALS.
16. PROVIDE AN AIR GAP. WHEN REQUIRED BY CODE, SERVING INDIVIDUAL FIXTURES, DEVICES, APPLIANCES AND APPARATUS.
17. ALL EXPOSED PIPE AND FITTINGS IN FINISHED AREAS SHALL BE CHROME PLATED.
18. MOUNT HOSE BIBBS 24" ABOVE FINISHED GRADE.
19. PROVIDE CLEANOUTS IN ACCORDANCE WITH ALL STATE AND LOCAL CODES. INSTALL CLEANOUT WITH COVER FLUSH TO FINISH SURFACE.
20. COORDINATE EXACT FLOOR DRAIN LOCATIONS WITH ARCHITECTURAL DRAWINGS. SET FLOOR DRAINS BELOW FINISHED FLOOR TO ALLOW FOR FLOOR SLOPING TO THE DRAIN.
21. COORDINATE PIPING WITH ALL ELECTRICAL EQUIPMENT (PANELS, TRANSFORMERS, ETC.) PRIOR TO ANY INSTALLATION. DO NOT ROUTE ANY PIPING OVER ANY ELECTRICAL PANELS UNDER ANY CIRCUMSTANCES. ANY PIPING RUN OVER PANELS SHALL BE RE-ROUTED AT NO ADDITIONAL COST.
22. ALL WALL MOUNTED LAVATORIES SHALL BE ATTACHED TO FLOOR MOUNTED CARRIER DESIGNED TO WITHSTAND A VERTICAL LOAD OF 250 POUNDS ON THE FRONT OF THE FIXTURE.
23. PROVIDE SANITARY WASTE, VENT, DOMESTIC WATER, ETC. ROUGH-IN AND MAKE FINAL CONNECTIONS (TO INCLUDE PROVIDING ALL NECESSARY RELATED STOPS, VALVES, TRAPS, ETC. AND MAKE READY FOR USE) TO ALL EQUIPMENT, WHETHER FURNISHED BY THIS CONTRACTOR OR FURNISHED BY OTHERS.
24. ALL MATERIALS AND EQUIPMENT INSTALLED IN RETURN AIR PLENUMS SHALL BE NON-COMBUSTIBLE AND UL APPROVED FOR USE IN A RETURN AIR PLENUM SPACE. IF MATERIALS ARE NOT NON-COMBUSTIBLE IN RETURN AIR PLENUMS, THEY SHALL BE REPLACED OR WRAPPED WITH A UL LISTED FIRE RATED FIRE WRAP (I.E. FYREWRAP 0.5 PLENUM INSULATION OR APPROVED EQUAL) AND INSTALLED IN ACCORDANCE WITH THE MANUFACTURES UL LISTED DETAILS AND RECOMMENDATIONS AT NO ADDITIONAL COST. (NOTE: REFER TO MECHACAL DRAWINGS FOR RETURN AIR PLENUM LOCATIONS.)
25. PIPING, INSULATION, FITTINGS, MATERIALS, COVERS AND FINISHES IN RETURN AIR PLENUM SHALL HAVE A MAXIMUM FLAME SPREAD RATING OF 25 AND A MAXIMUM SMOKE DEVELOPED RATING OF 50.

PLUMBING DRAWING INDEX

SHEET	DESCRIPTION
P001	PLUMBING SYMBOLS, LEGENDS, NOTES AND INDEX
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P211	ENLARGED PLUMBING PLAN LEVEL 1 GRAVITY - AREA 1
P212	ENLARGED PLUMBING PLAN LEVEL 1 GRAVITY - AREA 2
P213	ENLARGED PLUMBING PLAN LEVEL 1 GRAVITY - AREA 3
P214	ENLARGED PLUMBING PLAN LEVEL 1 GRAVITY - AREA 4
P215	ENLARGED PLUMBING PLAN LEVEL 1 GRAVITY - AREA 5
P216	ENLARGED PLUMBING PLAN LEVEL 1 GRAVITY - AREA 6
P217	ENLARGED PLUMBING PLAN LEVEL 1 PRESSURE - AREA 1
P218	ENLARGED PLUMBING PLAN LEVEL 1 PRESSURE - AREA 2
P219	ENLARGED PLUMBING PLAN LEVEL 1 PRESSURE - AREA 3
P220	ENLARGED PLUMBING PLAN LEVEL 1 PRESSURE - AREA 4
P221	ENLARGED PLUMBING PLAN LEVEL 1 PRESSURE - AREA 5
P222	ENLARGED PLUMBING PLAN LEVEL 1 PRESSURE - AREA 6
P223	ENLARGED PLUMBING RESTROOM- GRAVITY
P224	ENLARGED PLUMBING RESTROOM- PRESSURE
P410	PLUMBING DETAILS
P411	PLUMBING DETAILS
P710	PLUMBING ISOMETRICS
P711	PLUMBING ISOMETRICS
P712	PLUMBING ISOMETRICS
P713	PLUMBING ISOMETRICS
P714	PLUMBING ISOMETRICS

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Drawn By:	JAC
Checked By:	OD
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Drawing Scale:	

Drawing Title:
PLUMBING SYMBOLS, LEGENDS, NOTES AND INDEX

BID DOCUMENTS

Drawing No.:
P001

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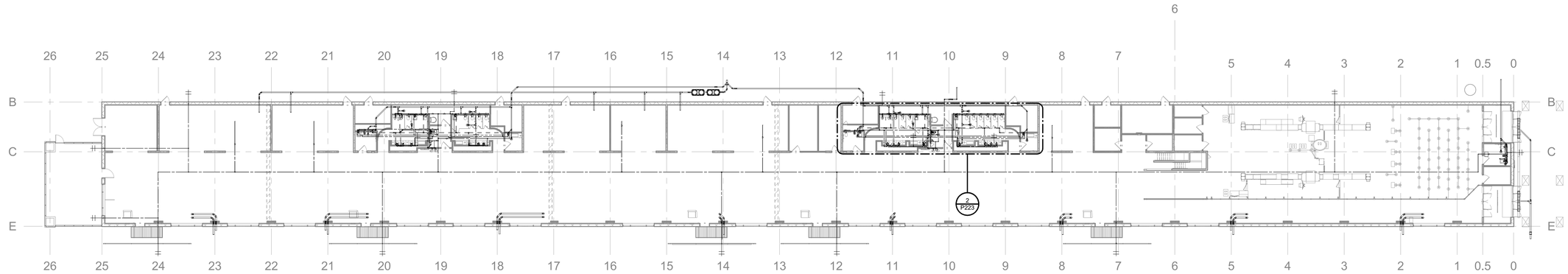
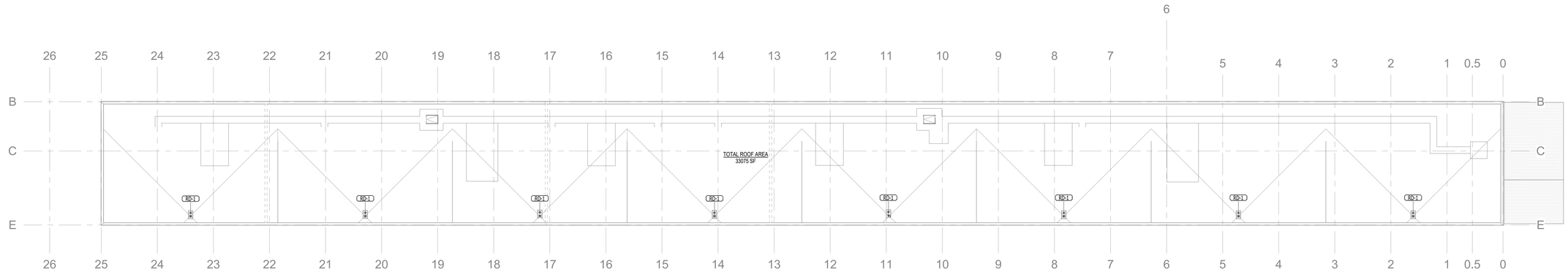


1 LEVEL 1 PLUMBING PLAN OVERALL

1" = 20'-0"

NORTH



2 PLUMBING ROOF PLAN

1" = 20'-0"

NORTH

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Drawing Title:

OVERALL PLUMBING FLOOR PLANS

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Drawing No.:

P110

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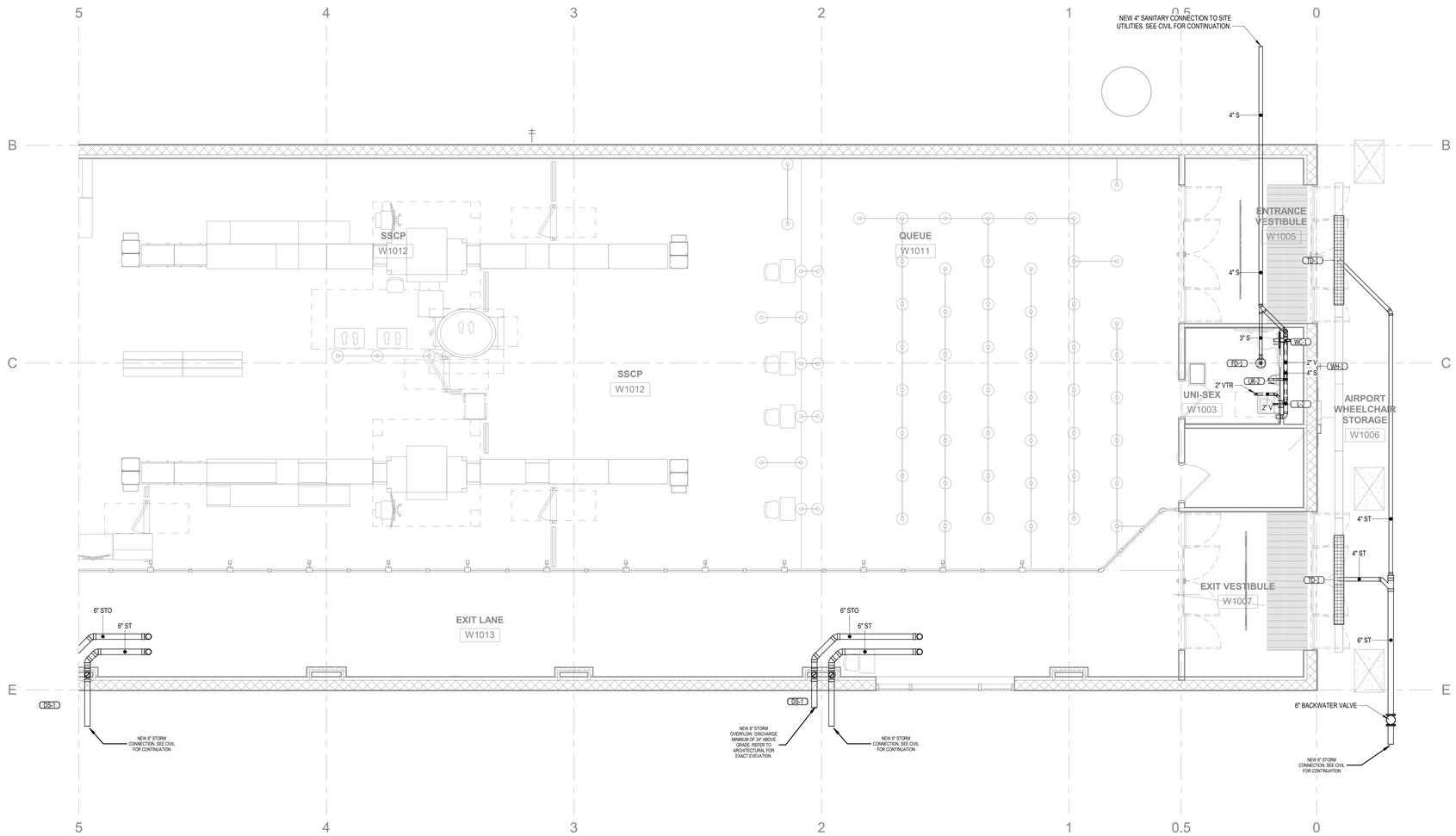

1 LEVEL 1 PLUMBING PLAN - AREA 1

3/16" = 1'-0"

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Drawing Title:
ENLARGED PLUMBING PLAN LEVEL 1 GRAVITY - AREA 1

BID DOCUMENTS

Drawing No.:
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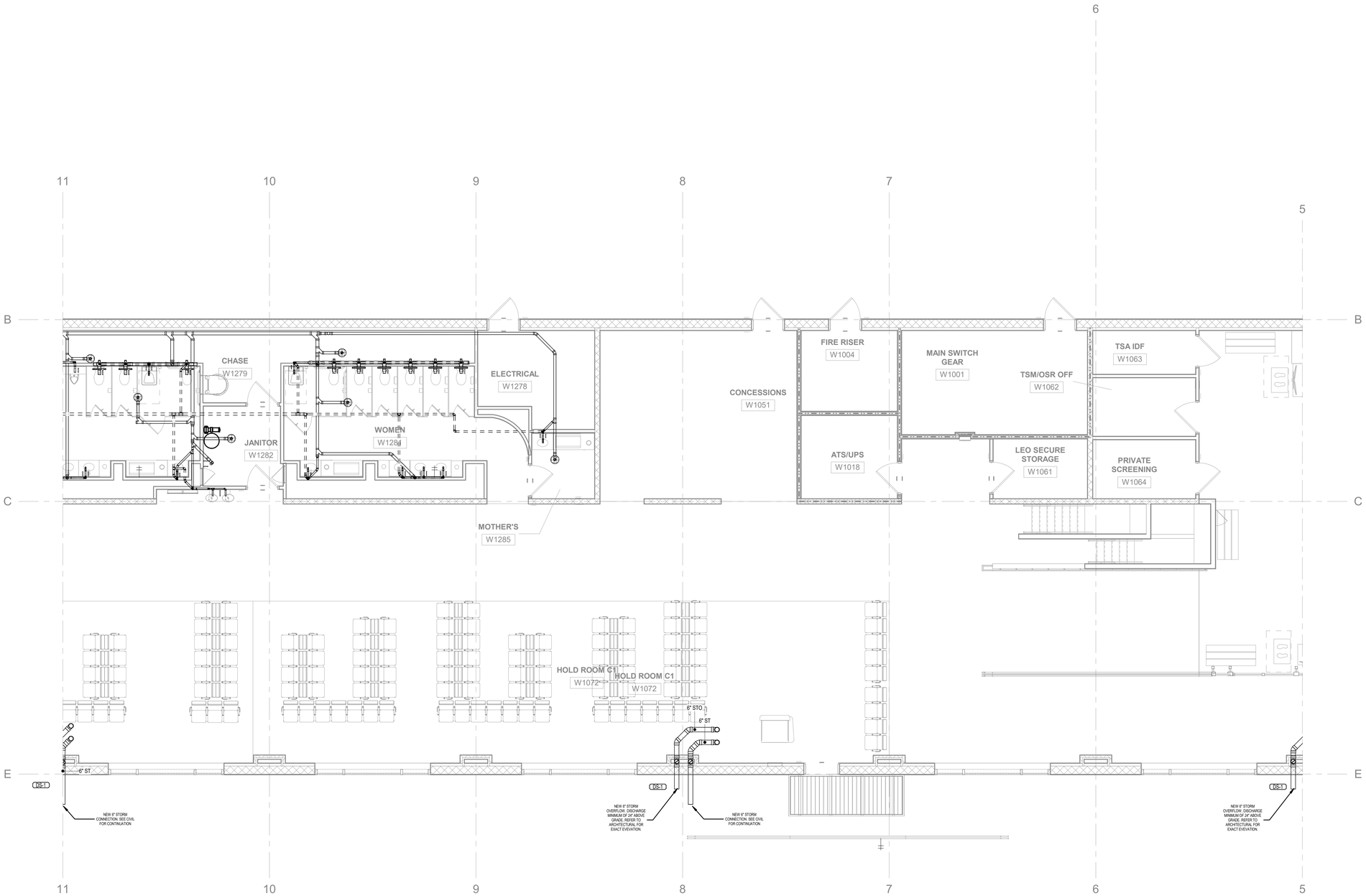

1 LEVEL 1 PLUMBING PLAN - AREA 2

3/16" = 1'-0"

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Drawing Title:
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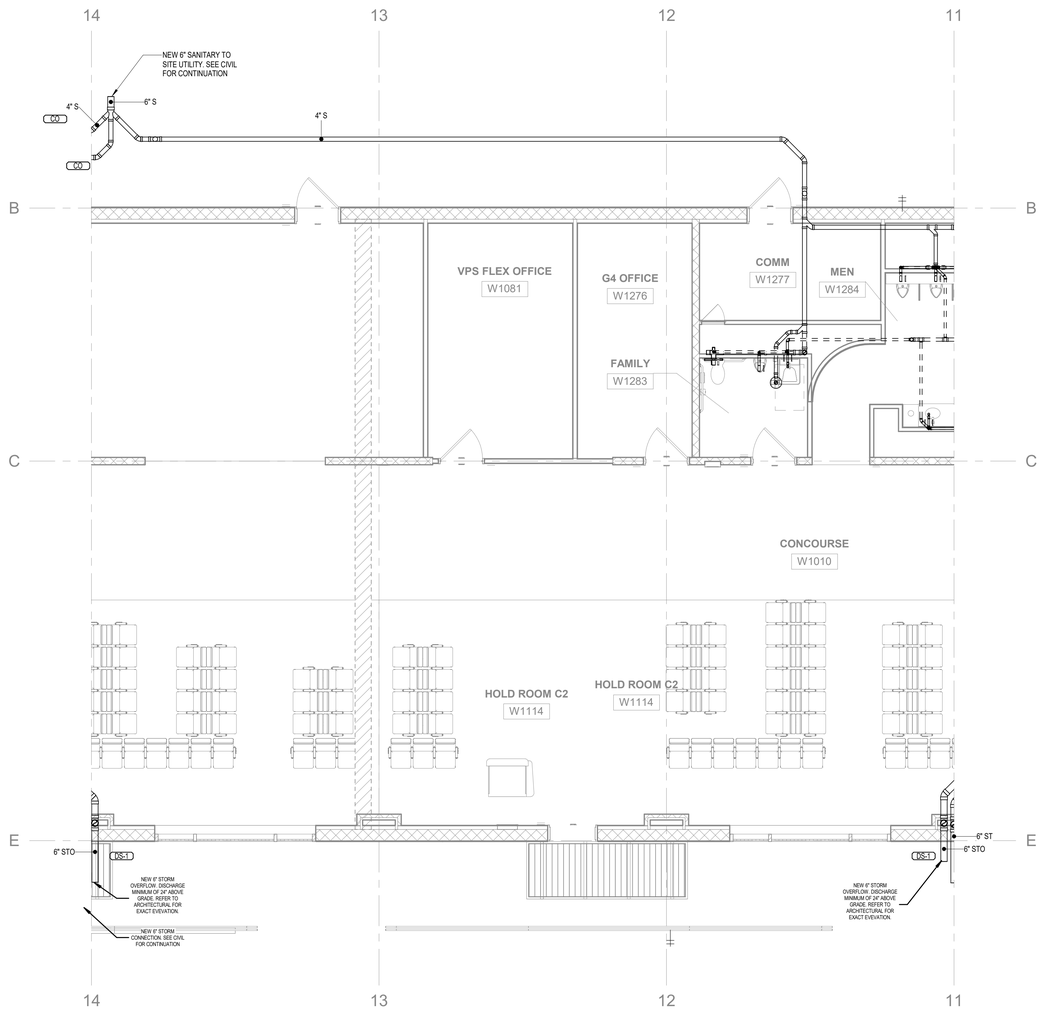

1 LEVEL 1 PLUMBING PLAN - AREA 3

3/16" = 1'-0"

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Drawing Title:
ENLARGED PLUMBING PLAN LEVEL 1 GRAVITY - AREA 3

BID DOCUMENTS

Drawing No.:
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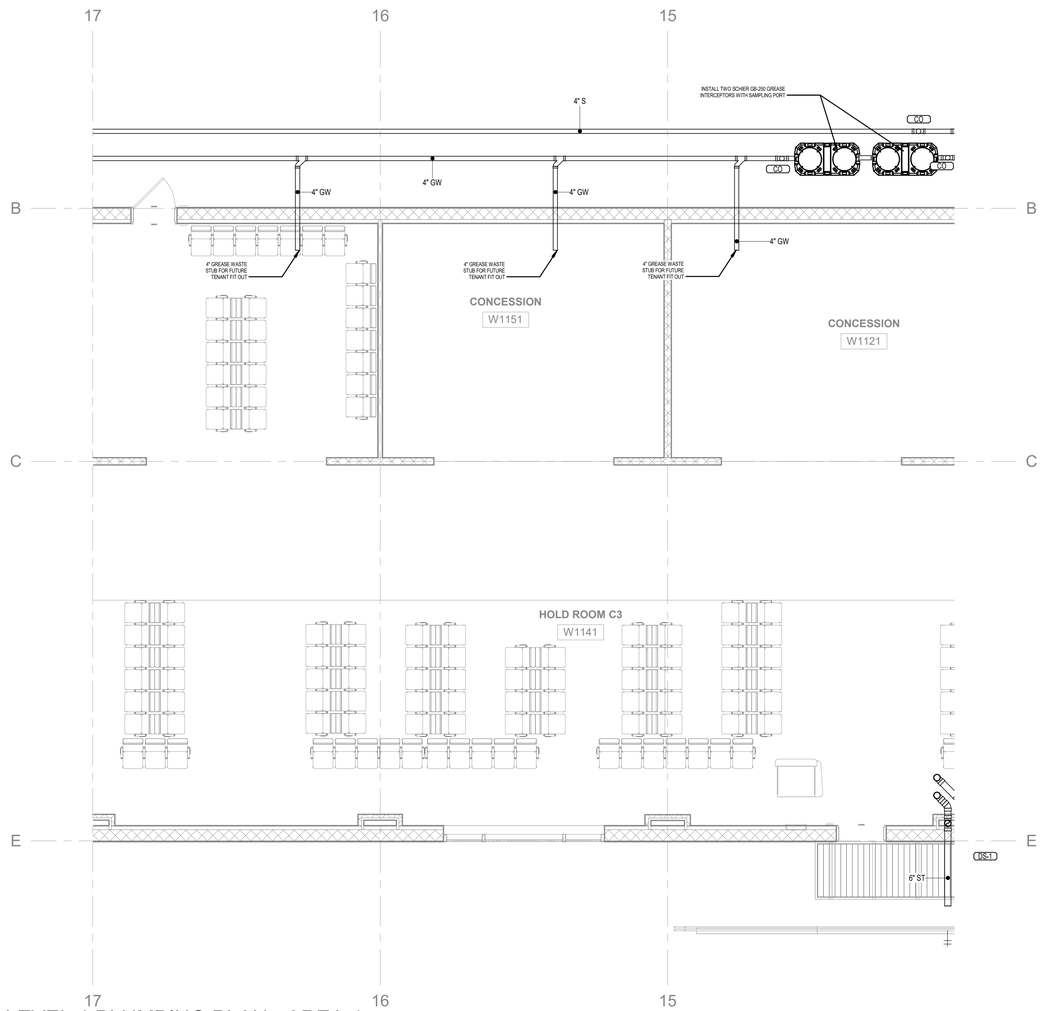

1 LEVEL 1 PLUMBING PLAN - AREA 4

3/16" = 1'-0"

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AA-C002208
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P 407.841.9050
COA 15
www.tlc-engineers.com
TLC No.: 719055
THINK. LISTEN. CREATE.

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Project No.:	MLM-19672
Designed By:	JAC
Drawn By:	JAC
Checked By:	OD
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:
ENLARGED PLUMBING PLAN LEVEL 1 GRAVITY - AREA 4

BID DOCUMENTS

Drawing No.:
P214

BIM 360://Design of Satellite Concourse/VPS-MLM_MEP.rvt
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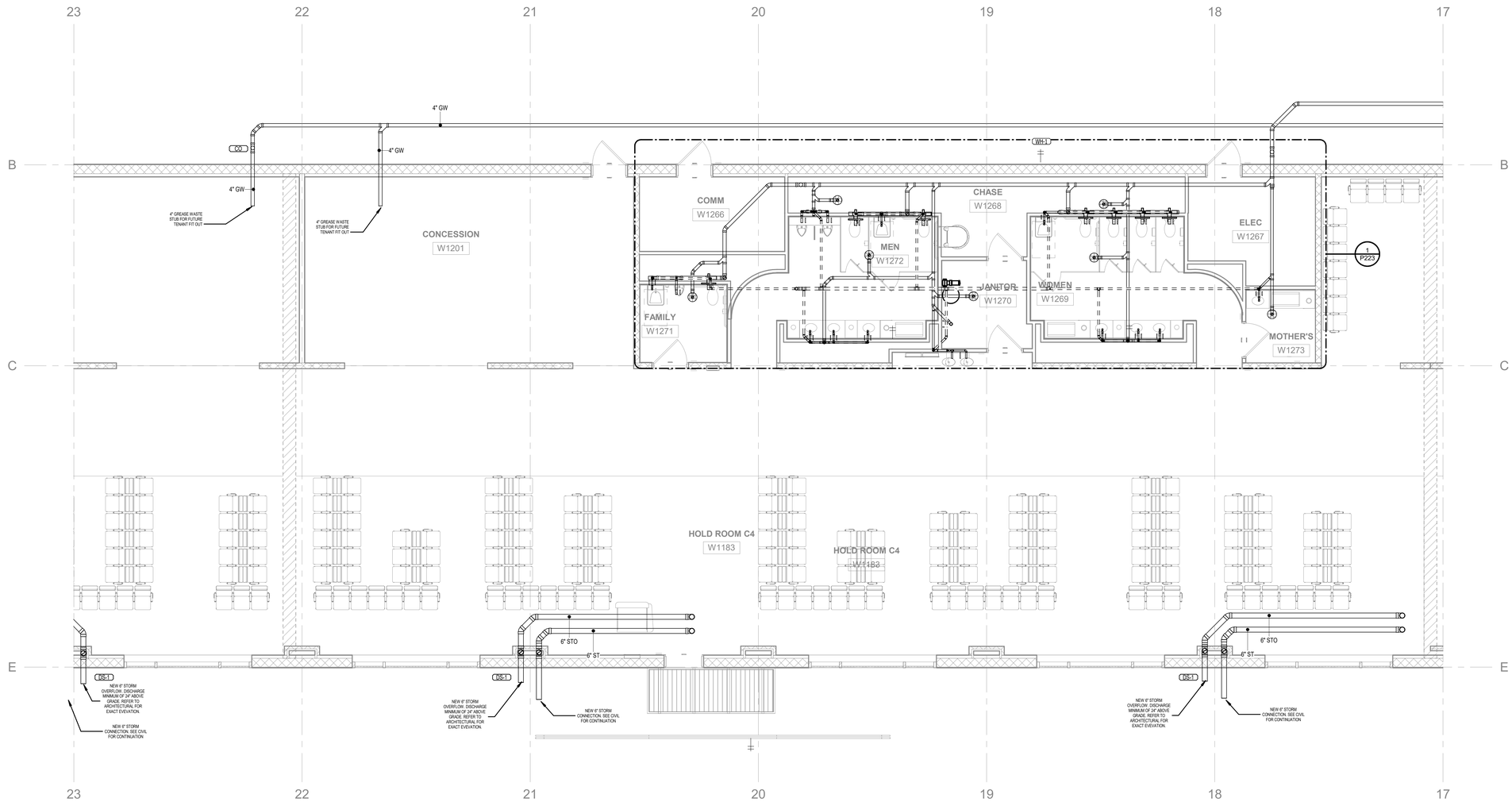

1 LEVEL 1 PLUMBING PLAN - AREA 5

3/16" = 1'-0"

BIM 360://Design of Satellite Concourse/VPS-MLM_MEP.rvt

12/4/2020 2:05:21 PM

OKALOOSA COUNTY

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Designed By:	JAC
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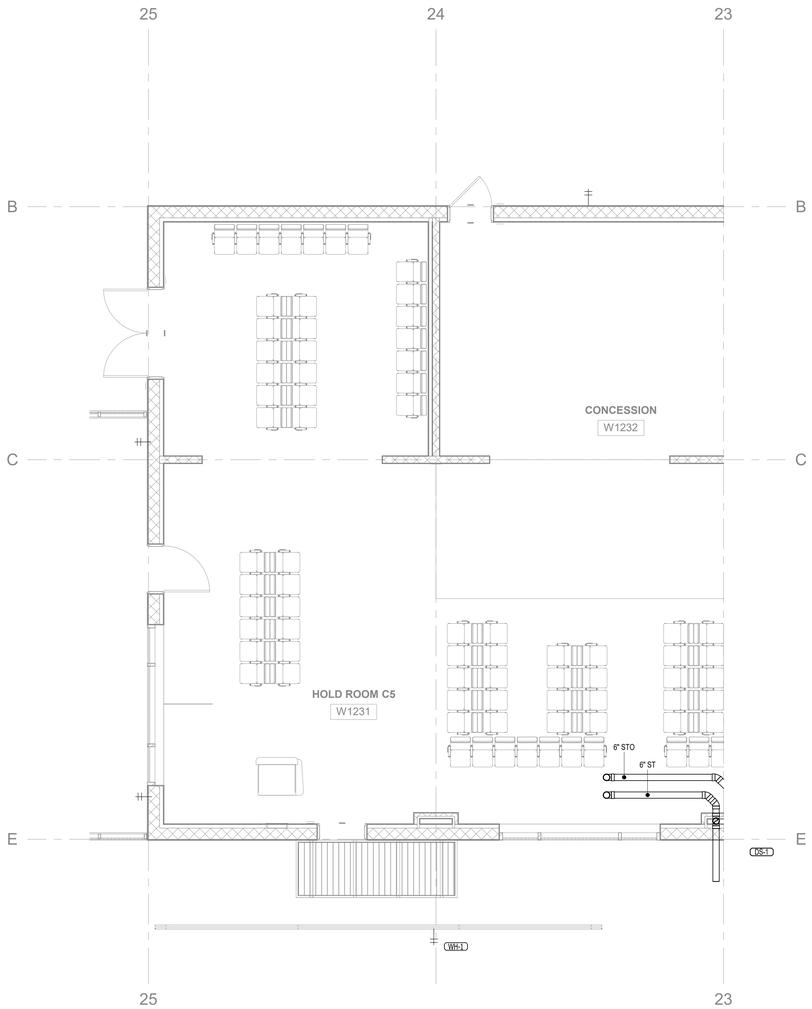
Checked By:	OD
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:
ENLARGED PLUMBING PLAN LEVEL 1 GRAVITY - AREA 5

BID DOCUMENTS

Drawing No.:
P215



1 LEVEL 1 PLUMBING PLAN - AREA 6

3/16" = 1'-0"

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12/4/2020 2:05:24 PM

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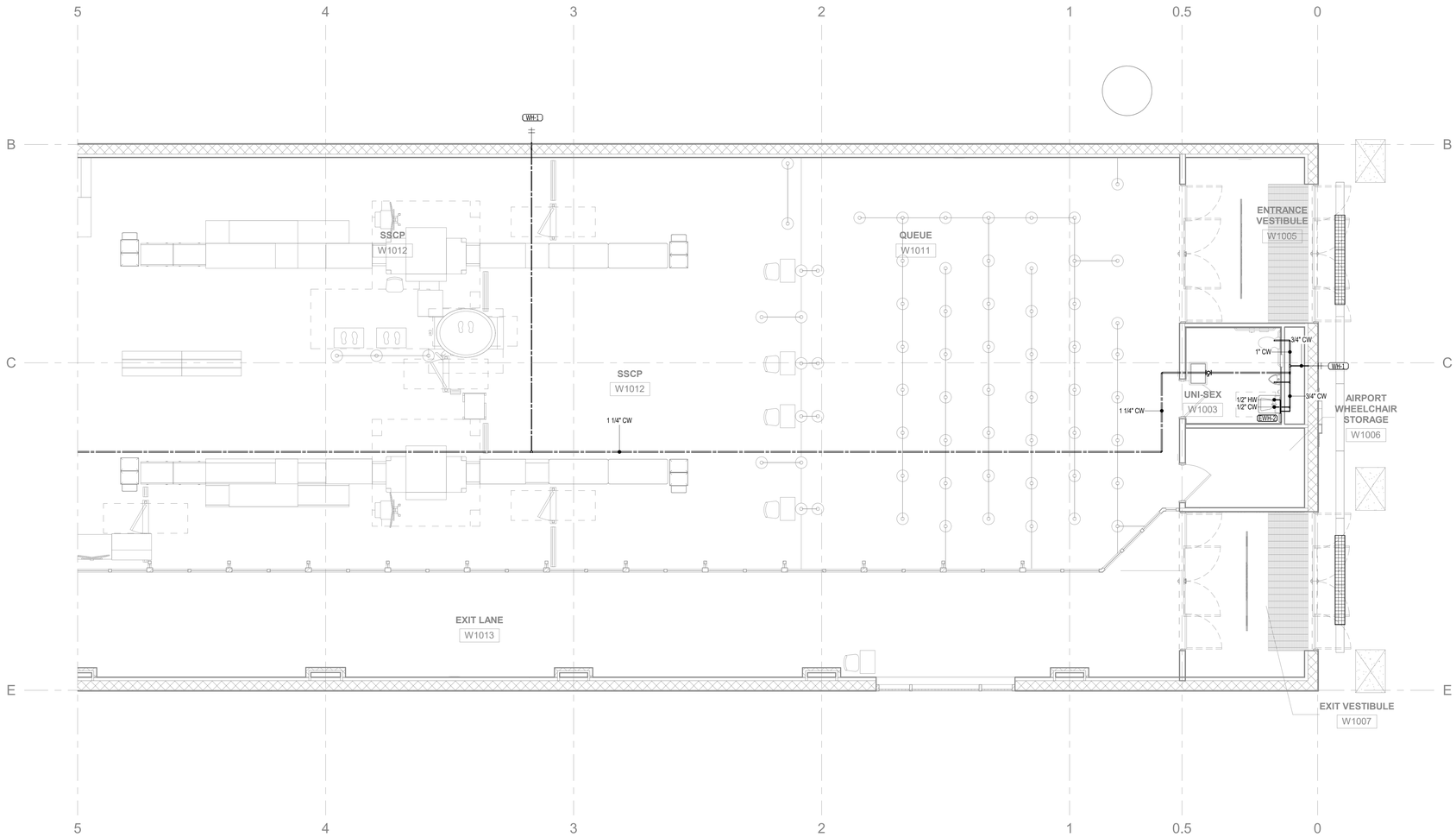
Checked By:	OD
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:
ENLARGED PLUMBING PLAN LEVEL 1 GRAVITY - AREA 6

BID DOCUMENTS

Drawing No.:
P216



1 LEVEL 1 PLUMBING PLAN AREA 1

3/16" = 1'-0"

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12/4/2020 1:35:21 PM

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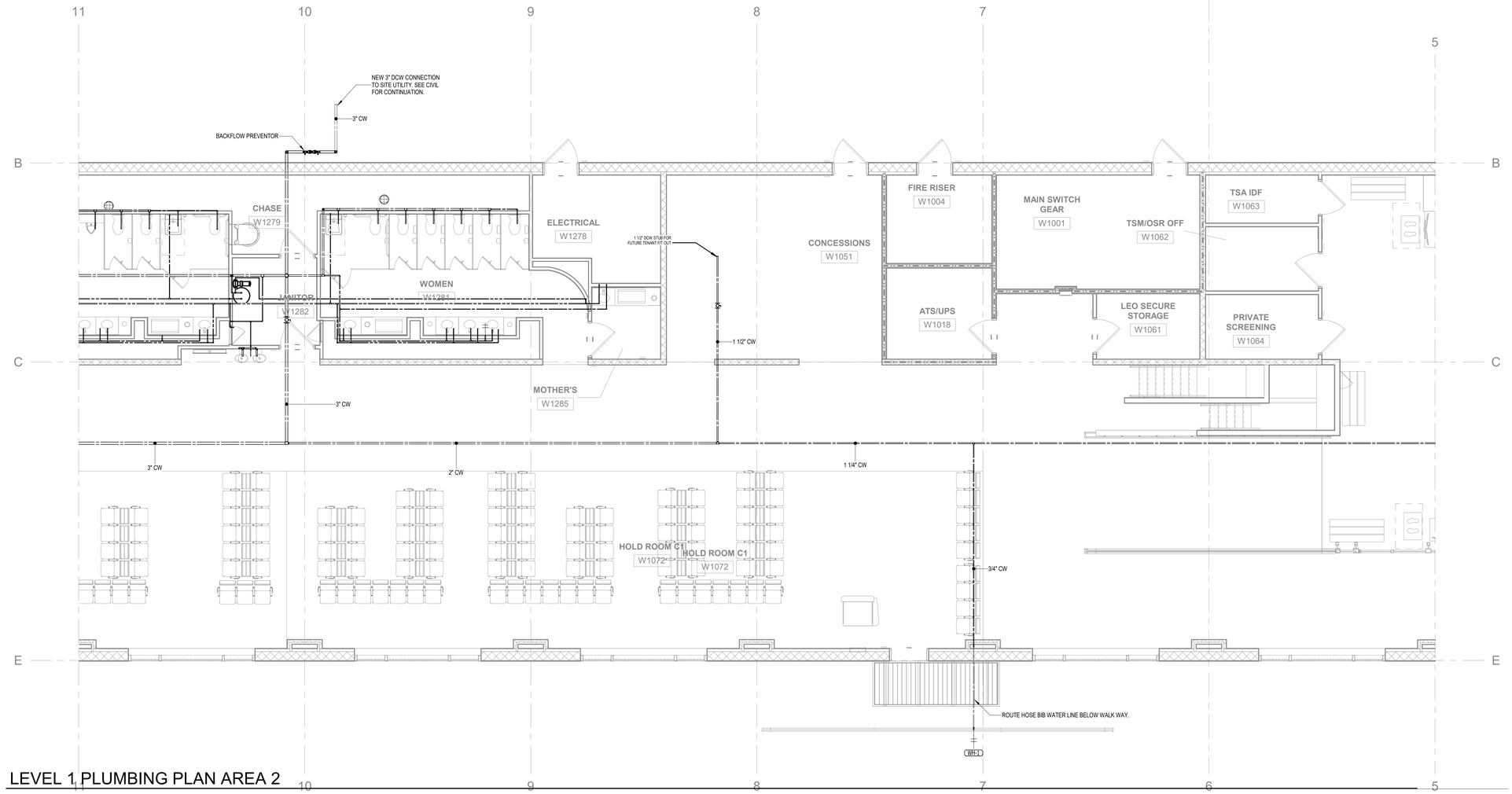
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:
ENLARGED PLUMBING PLAN LEVEL 1 PRESSURE - AREA 1

BID DOCUMENTS

Drawing No.:
P217



1 LEVEL 1 PLUMBING PLAN AREA 2

3/16" = 1'-0"

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Drawn By:	JAC
Checked By:	OD
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:
ENLARGED PLUMBING PLAN LEVEL 1 PRESSURE - AREA 2

BID DOCUMENTS

Drawing No.:
P218

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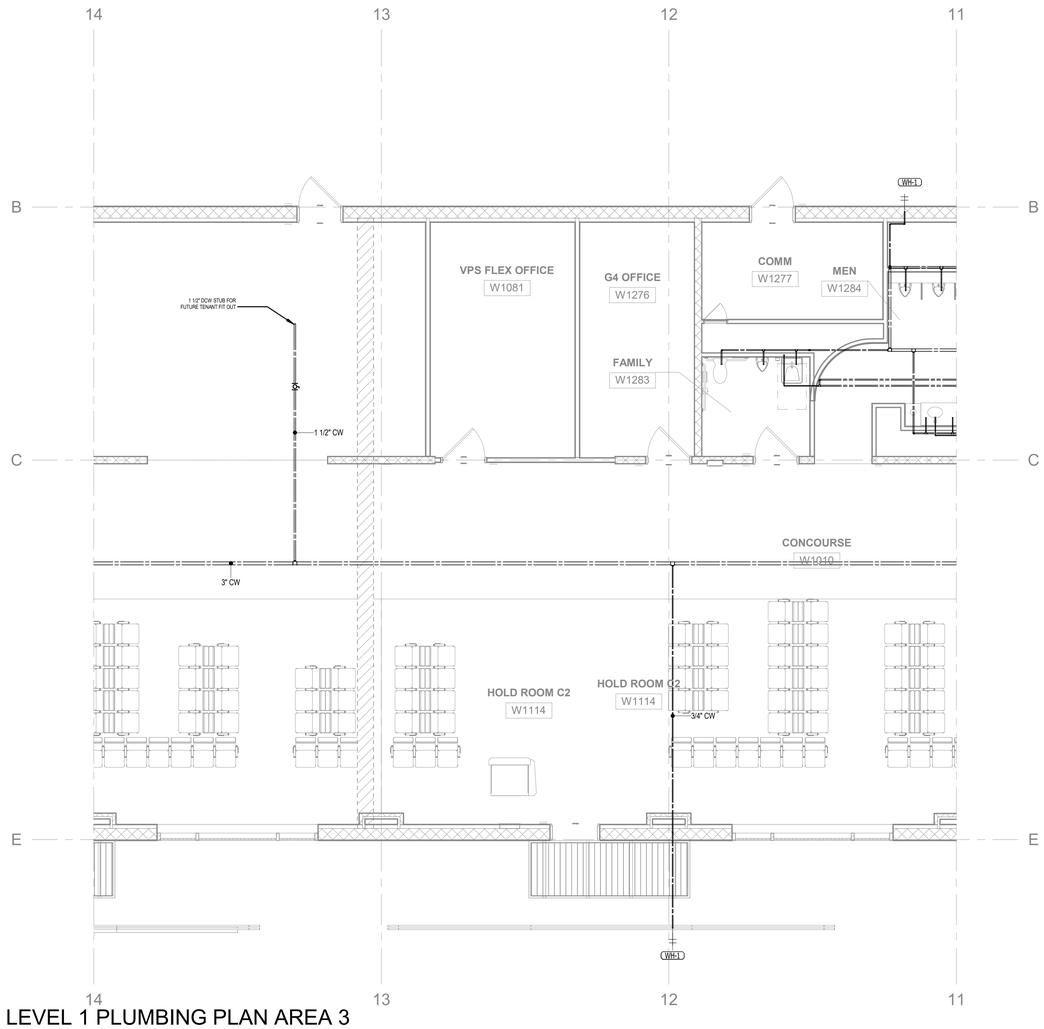

1 LEVEL 1 PLUMBING PLAN AREA 3

3/16" = 1'-0"

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12/4/2020 1:35:29 PM

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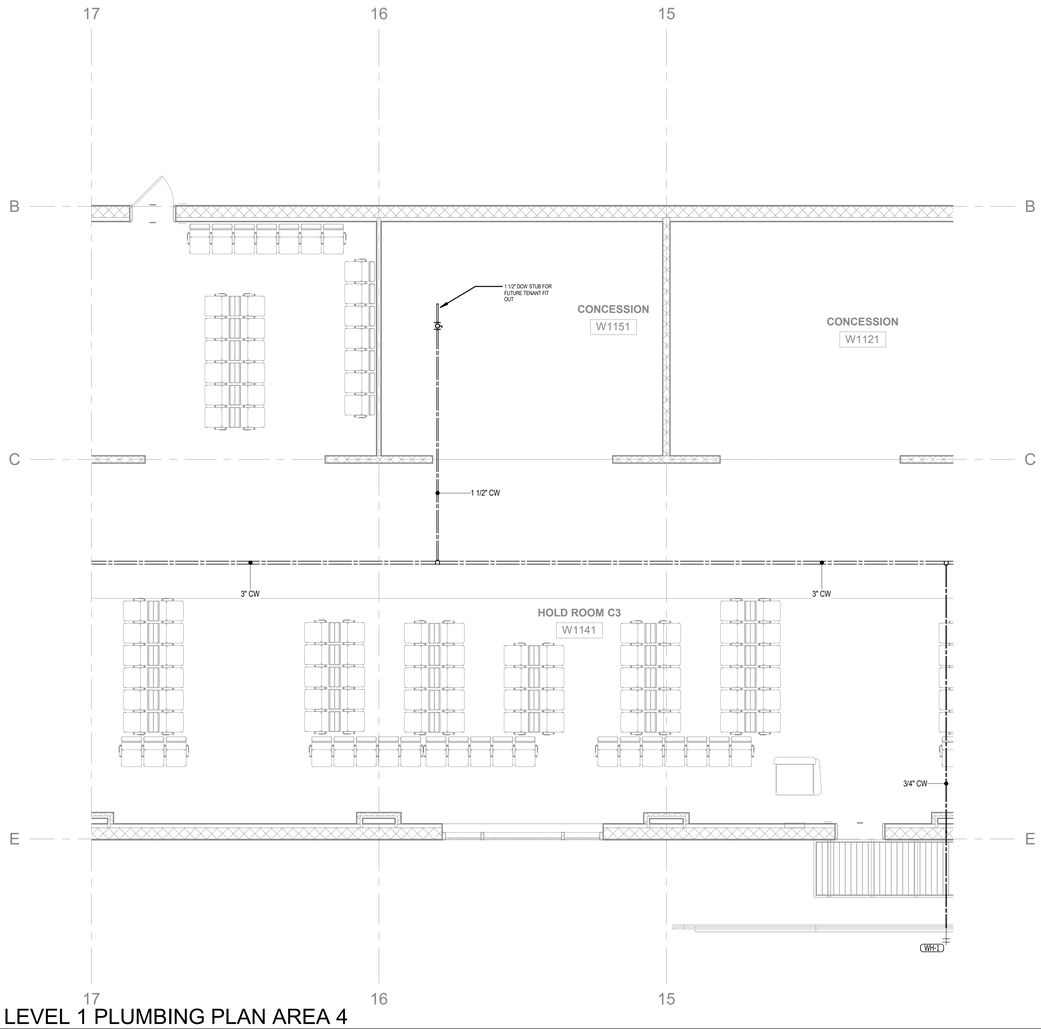
Checked By:	OD
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:
ENLARGED PLUMBING PLAN LEVEL 1 PRESSURE - AREA 3

BID DOCUMENTS

Drawing No.:
P219



1 LEVEL 1 PLUMBING PLAN AREA 4

3/16" = 1'-0"

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12/4/2020 1:35:33 PM

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Checked By:	OD
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

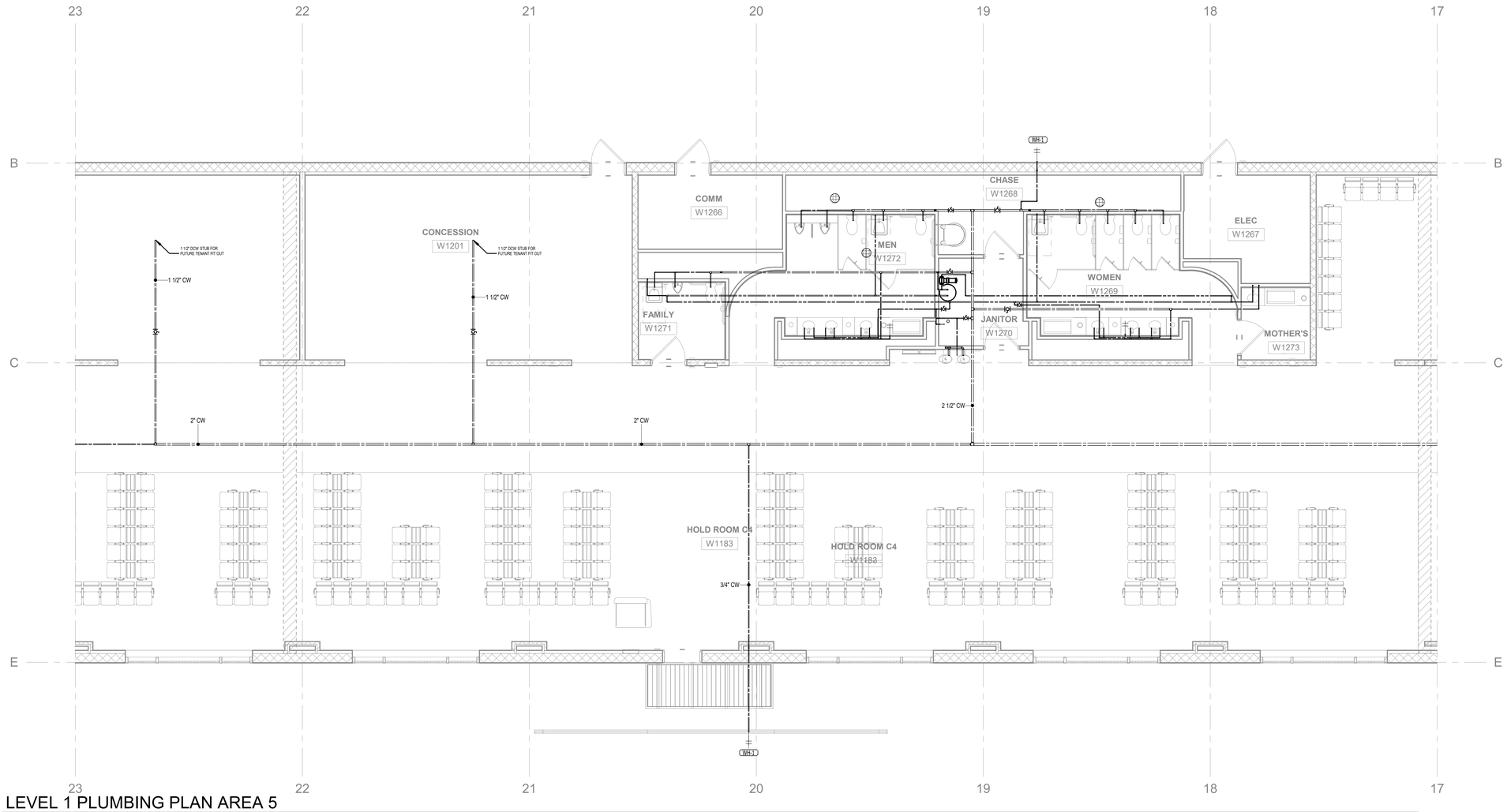
Drawing Title:

ENLARGED PLUMBING PLAN LEVEL 1 PRESSURE - AREA 4

BID DOCUMENTS

Drawing No.:

P220



1 LEVEL 1 PLUMBING PLAN AREA 5

3/16" = 1'-0"

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12/4/2020 5:07:01 PM

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Drawn By:	JAC
Checked By:	OD
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

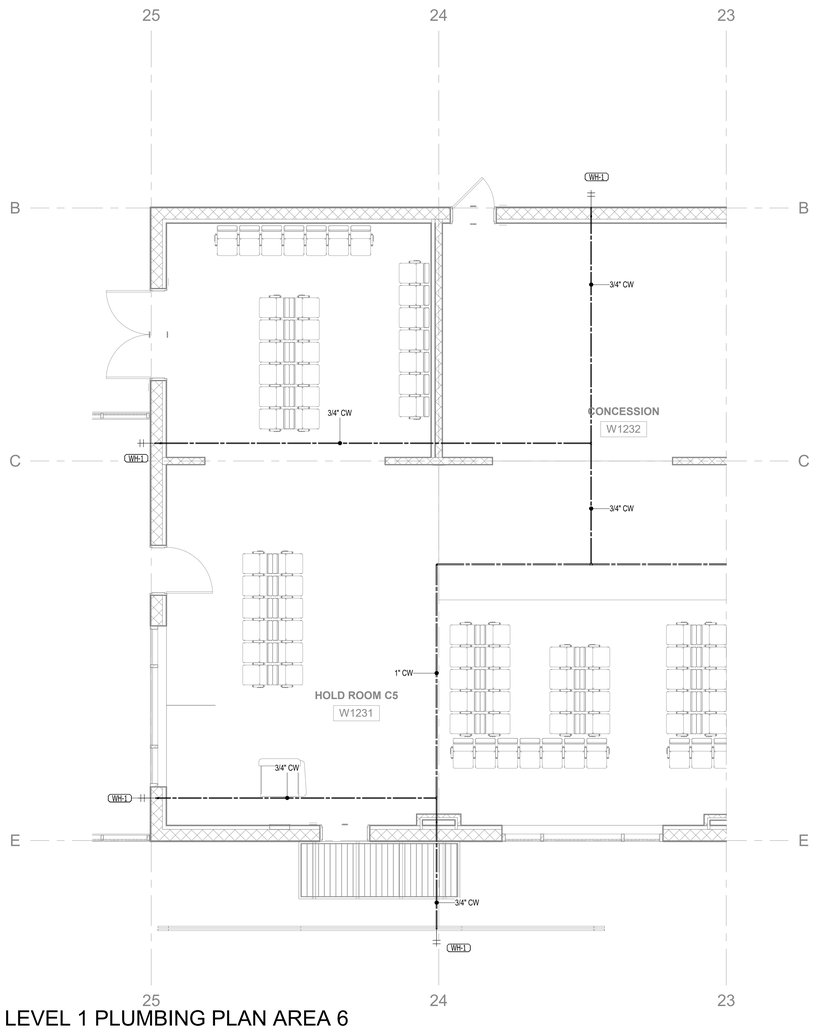
Drawing Title:

ENLARGED PLUMBING PLAN LEVEL 1 PRESSURE - AREA 5

BID DOCUMENTS

Drawing No.:

P221



1 LEVEL 1 PLUMBING PLAN AREA 6

3/16" = 1'-0"

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12/4/2020 1:35:41 PM

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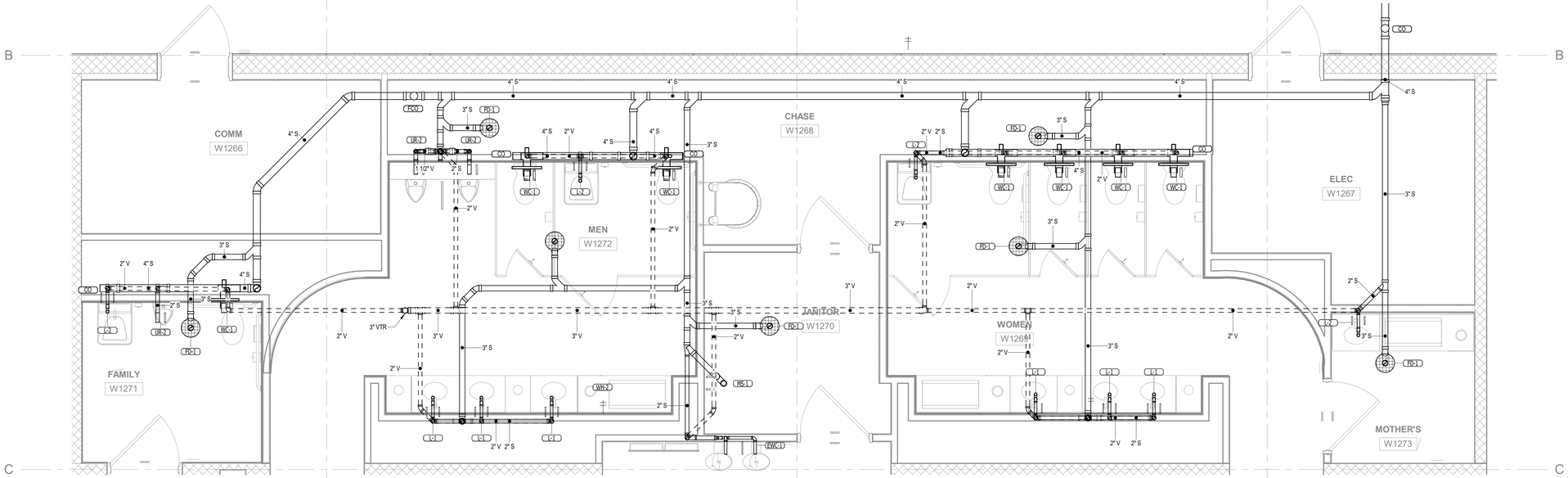
Drawn By:	JAC
Checked By:	OD
Issue Date:	30-NOV-2020
Drawing Scale:	3/16" = 1'-0"

Drawing Title:
ENLARGED PLUMBING PLAN LEVEL 1 PRESSURE - AREA 6

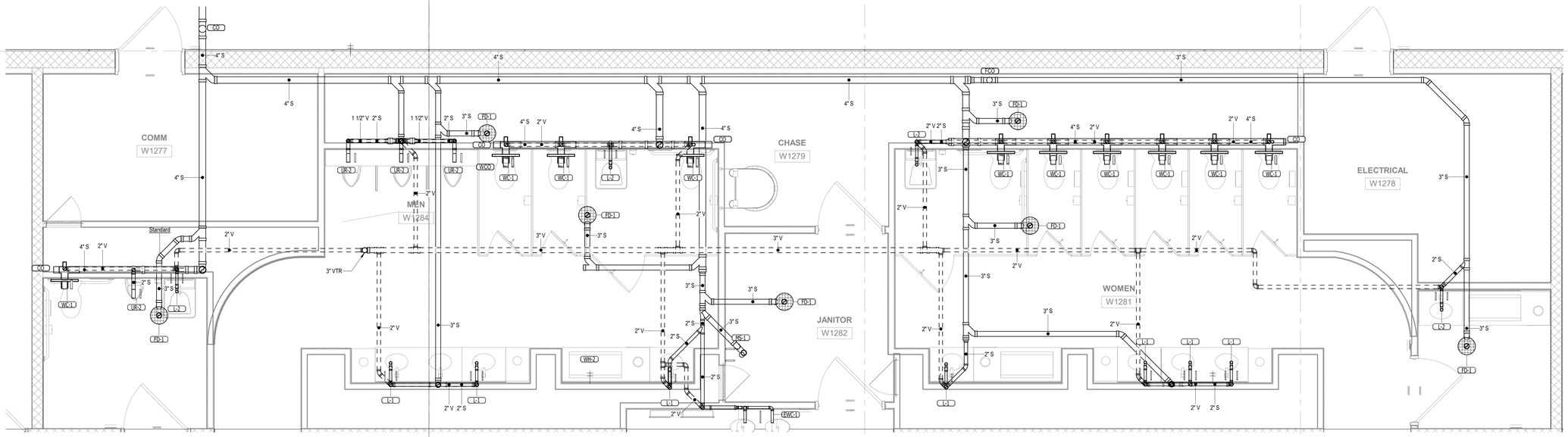
BID DOCUMENTS

Drawing No.:
P222



1 LEVEL 1 PLUMBING- ALT 2 RESTROOM CALLOUT GRAVITY

3/8" = 1'-0"



2 LEVEL 1 PLUMBING- BASE BID RESTROOM CALLOUT GRAVITY

3/8" = 1'-0"

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12/4/2020 1:35:47 PM

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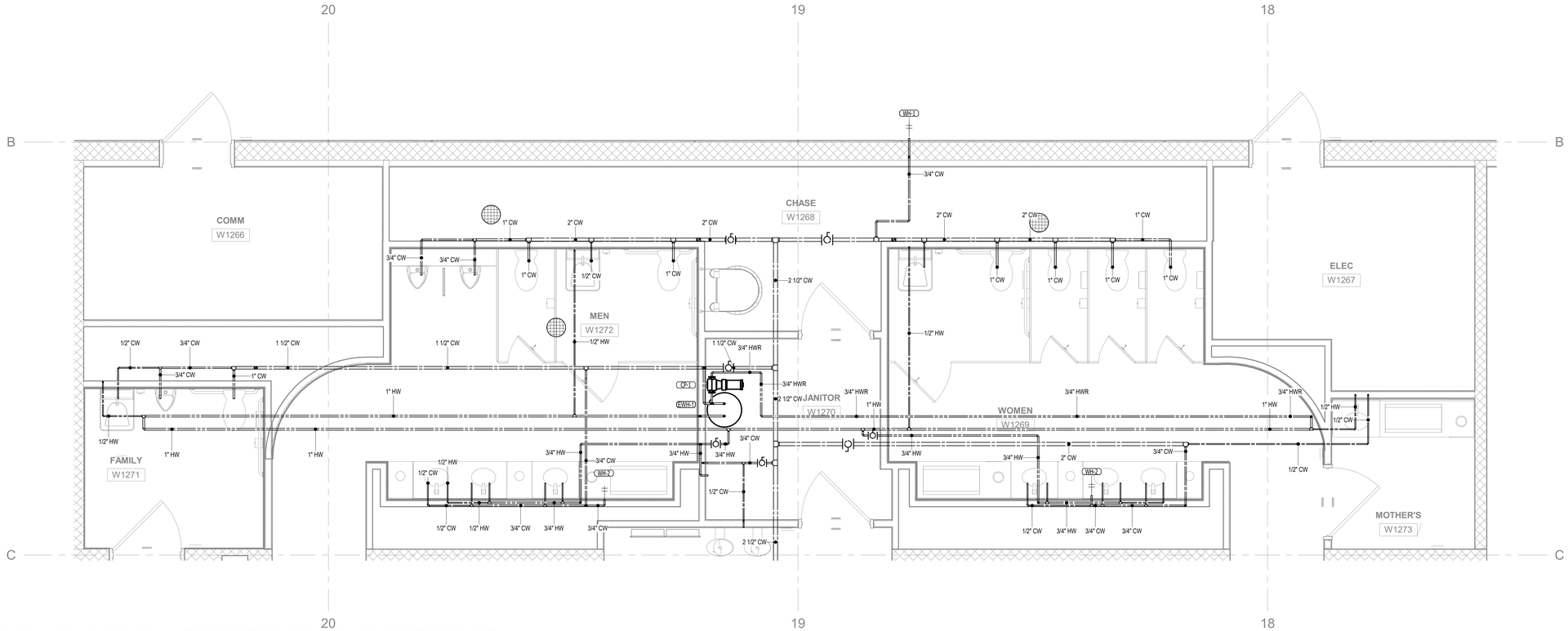
Checked By:	OD
Issue Date:	30-NOV-2020
Drawing Scale:	3/8" = 1'-0"

Drawing Title:
ENLARGED PLUMBING RESTROOM-GRAVITY

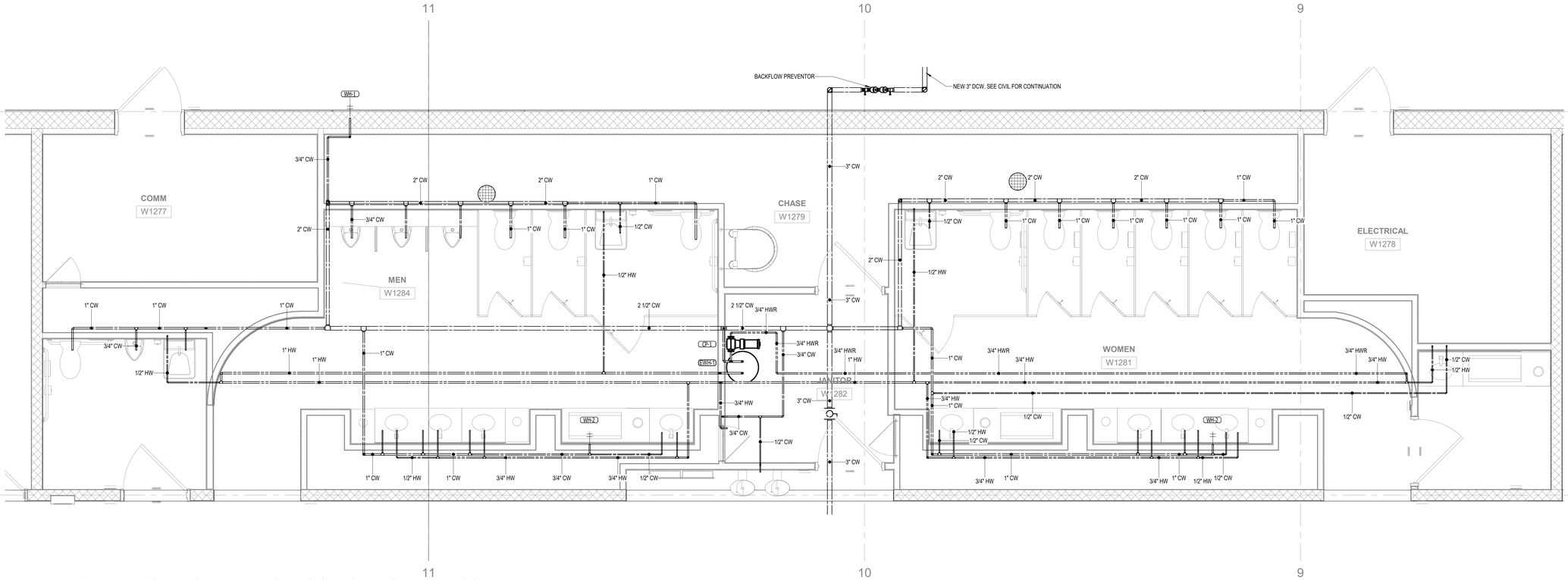
BID DOCUMENTS

Drawing No.:
P223



1 LEVEL 1 PLUMBING- ALT 2 RESTROOM CALLOUT PRESSURE

3/8" = 1'-0"



2 LEVEL 1 PLUMBING- BASE BID RESTROOM CALLOUT PRESSURE

3/8" = 1'-0"

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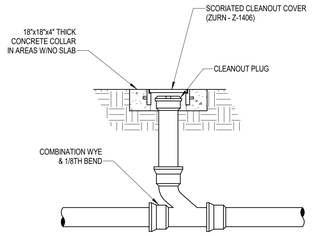
Designed By:	JAC
Drawn By:	JAC
Checked By:	OD
Issue Date:	30-NOV-2020
Drawing Scale:	3/8" = 1'-0"

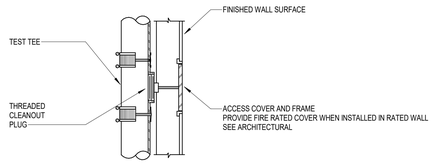
Drawing Title:
ENLARGED PLUMBING RESTROOM-PRESSURE

BID DOCUMENTS

Drawing No.:
P224



1 EXTERIOR CLEANOUT
N.T.S.



2 WALL CLEANOUT
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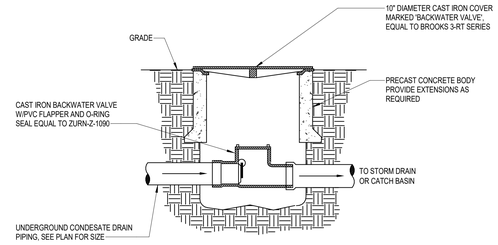

3 BACKWATER VALVE
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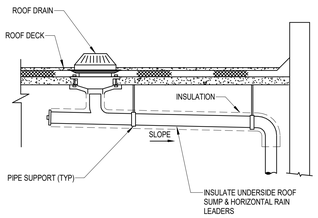

4 ROOF DRAIN - INSULATED
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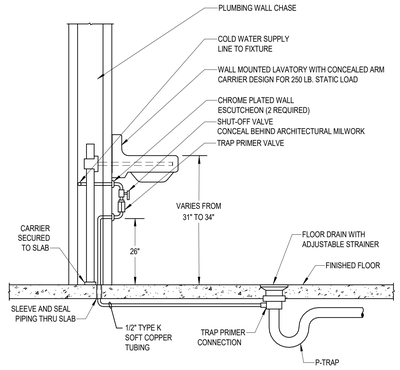

5 TRAP PRIMER
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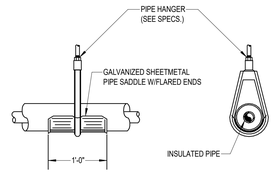

6 INSULATED PIPE HANGER
N.T.S.

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Drawn By:	JAC
Checked By:	OD
Issue Date:	30-NOV-2020
Drawing Scale:	12" = 1'-0"

Drawing Title:

PLUMBING DETAILS

BID DOCUMENTS

Drawing No.:

P410

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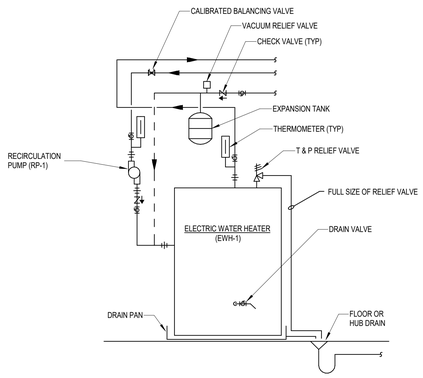

1 ELECTRIC WATER HEATER
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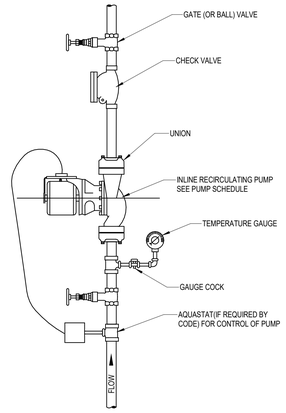

2 RECIRCULATING PUMP
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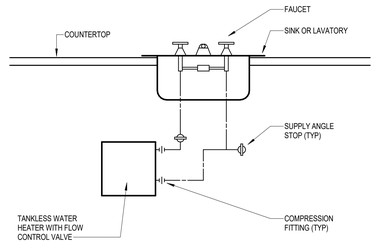


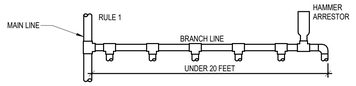
NOTE:

ALL PIPING BETWEEN WATER HEATER AND FAUCET SHALL BE A MINIMUM OF 1/2".

3 TANKLESS ELECTRIC WATER HEATER
N.T.S.

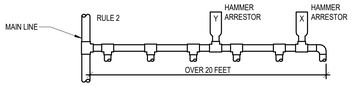
RULE 1: BRANCH LINES OF 20 FEET OR LESS.

THE HAMMER ARRESTOR TO BE PLACED AT THE END OF THE BRANCH LINE BETWEEN THE LAST TWO FIXTURES.



RULE 2: BRANCH LINES OVER 20 FEET

AN ADDITIONAL HAMMER ARRESTOR (Y) TO BE PLACED AS SHOWN (BELOW). THE ADDITIONAL UNIT PLACED AT THE MIDPOINT OF THE RUN LONGER THAN 20 FEET. THE SUM OF THE FIXTURE UNIT RATINGS OF (X) AND (Y) COMBINED, SHOULD BE EQUAL TO OR GREATER THAN THE DEMAND OF ALL BRANCHES. INSTALL IN A ACCESSIBLE AREA



SHOCK ARRESTOR SCHEDULE

MARK	FIXTURE UNITS	MANUFACTURER	MODEL	N.P.T.
SA-A	1-11	PRECISION PLUMBING PRODUCTS	SC-500A	1/2"
SA-B	12-32	PRECISION PLUMBING PRODUCTS	SC-750B	3/4"
SA-C	33-60	PRECISION PLUMBING PRODUCTS	SC-1000C	1"
SA-D	61-113	PRECISION PLUMBING PRODUCTS	SC-1250D	1"
SA-E	114-154	PRECISION PLUMBING PRODUCTS	SC-1500E	1"
SA-F	155-330	PRECISION PLUMBING PRODUCTS	SC-2000F	1"

NOTES:

1. PISTON OPERATED, TYPE "K" COPPER BARREL WITH BRASS THREADED ADAPTOR, ALL JOINTS SHALL BE MADE WITH 95-5 LEAD FREE SOLDER. THE PISTON SHALL BE EQUIPPED WITH TWO (2) "O" RINGS TO PROVIDE A PERMANENT MECHANICAL BARRIER BETWEEN FLUID AND PRE-LOAD AIR CHARGE. ARRESTORS MAY BE INSTALLED IN VERTICAL AND HORIZONTAL POSITION. THE ARRESTOR SHALL BE FULLY GUARANTEED FOR ENTIRE SYSTEM LIFE.

4 SHOCK ARRESTOR
N.T.S.

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Drawing Title:

PLUMBING DETAILS

BID DOCUMENTS

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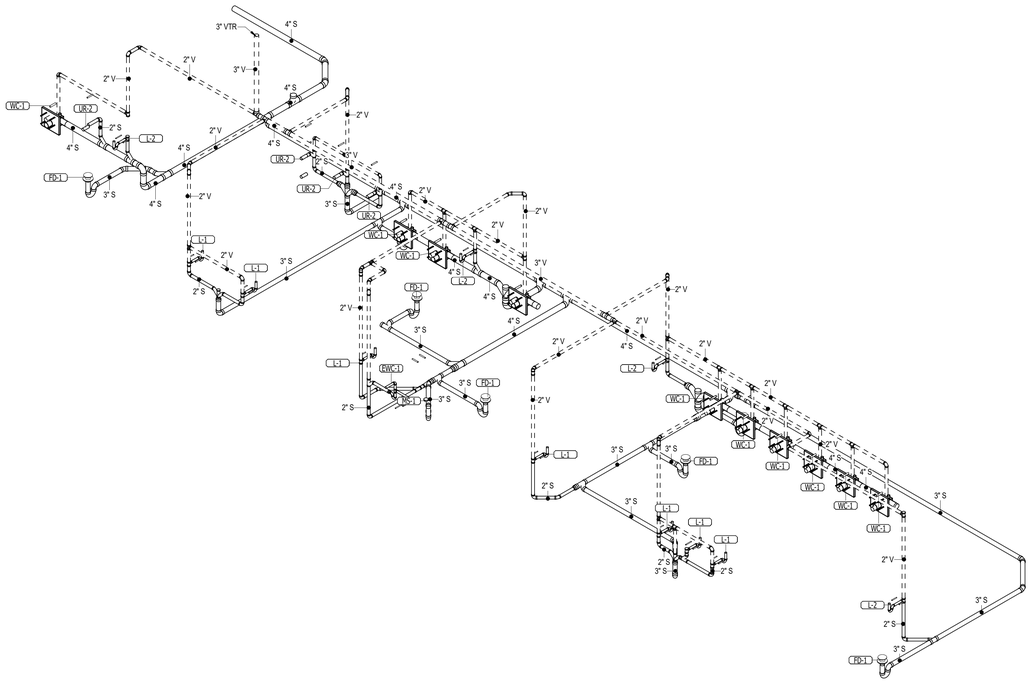

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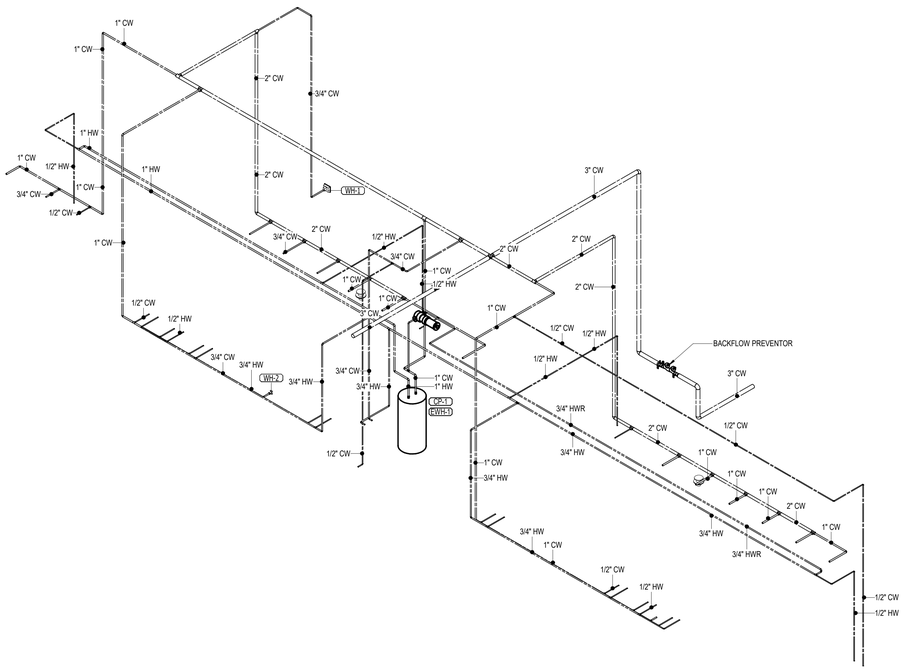

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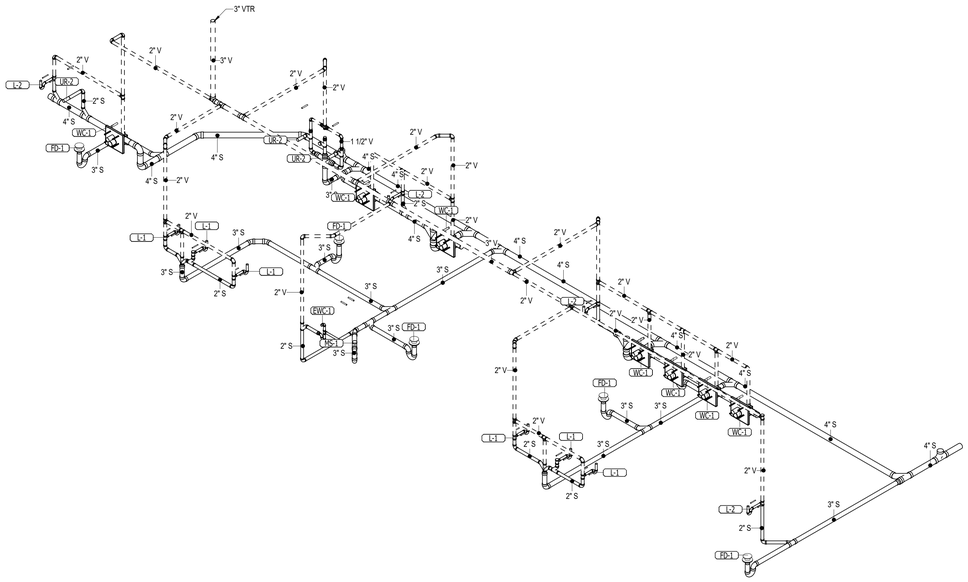

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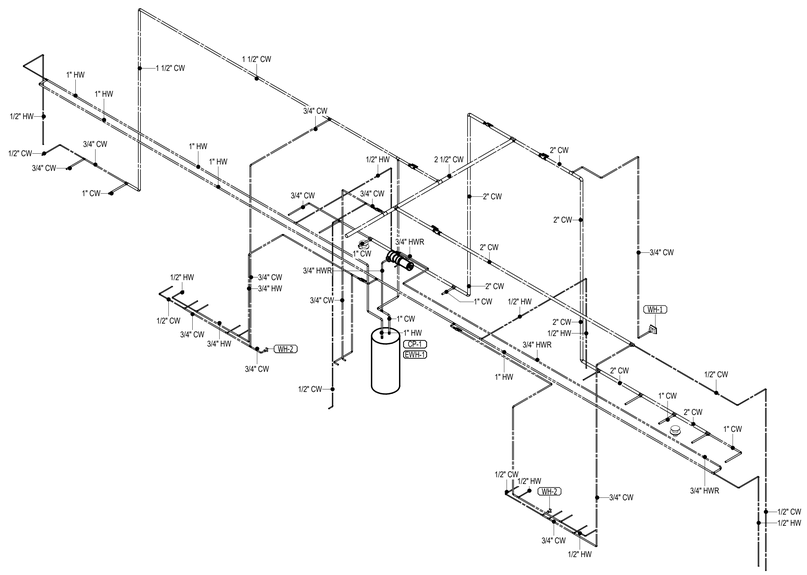

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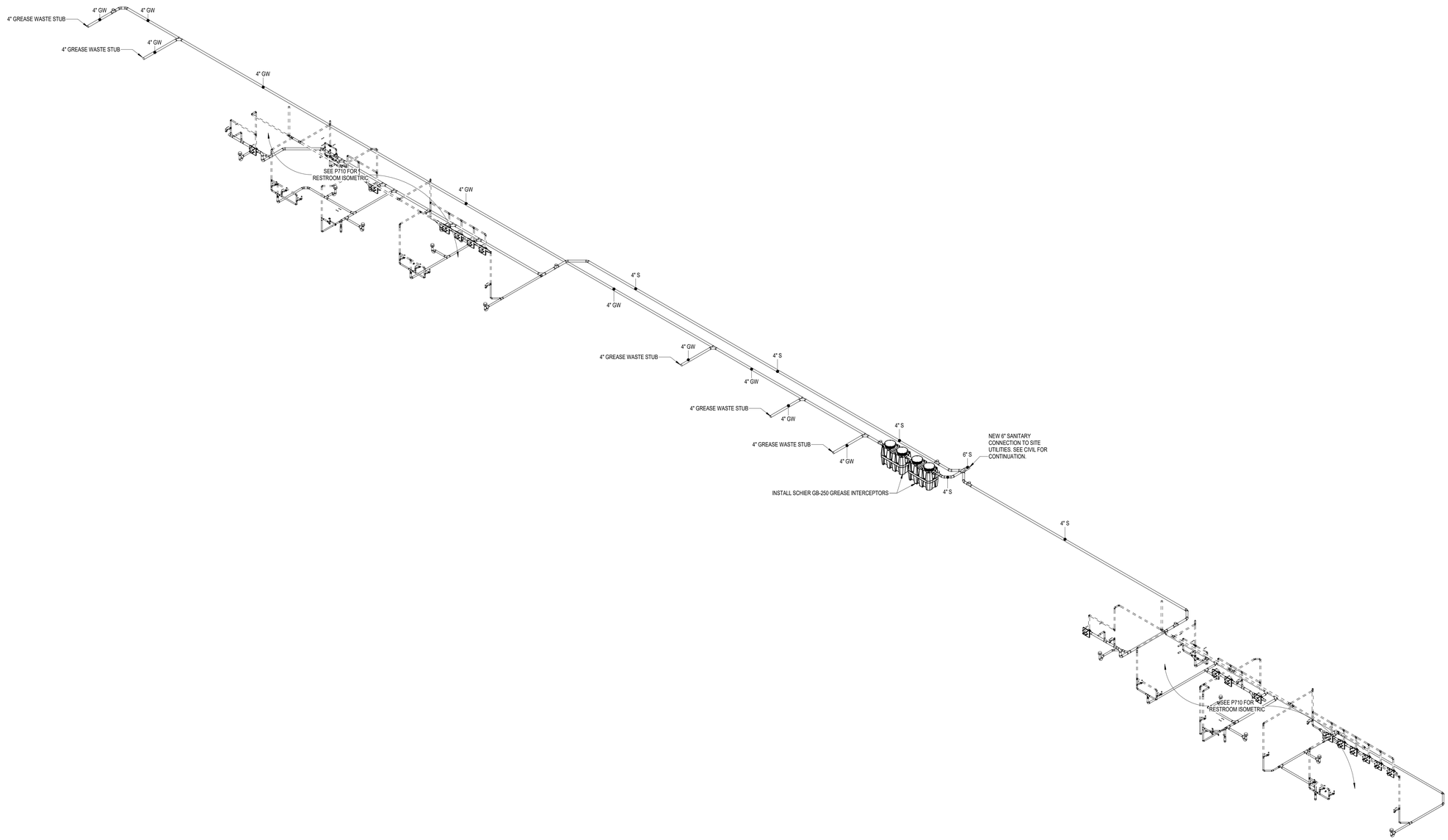

1 OVERALL GRAVITY ISOMETRIC

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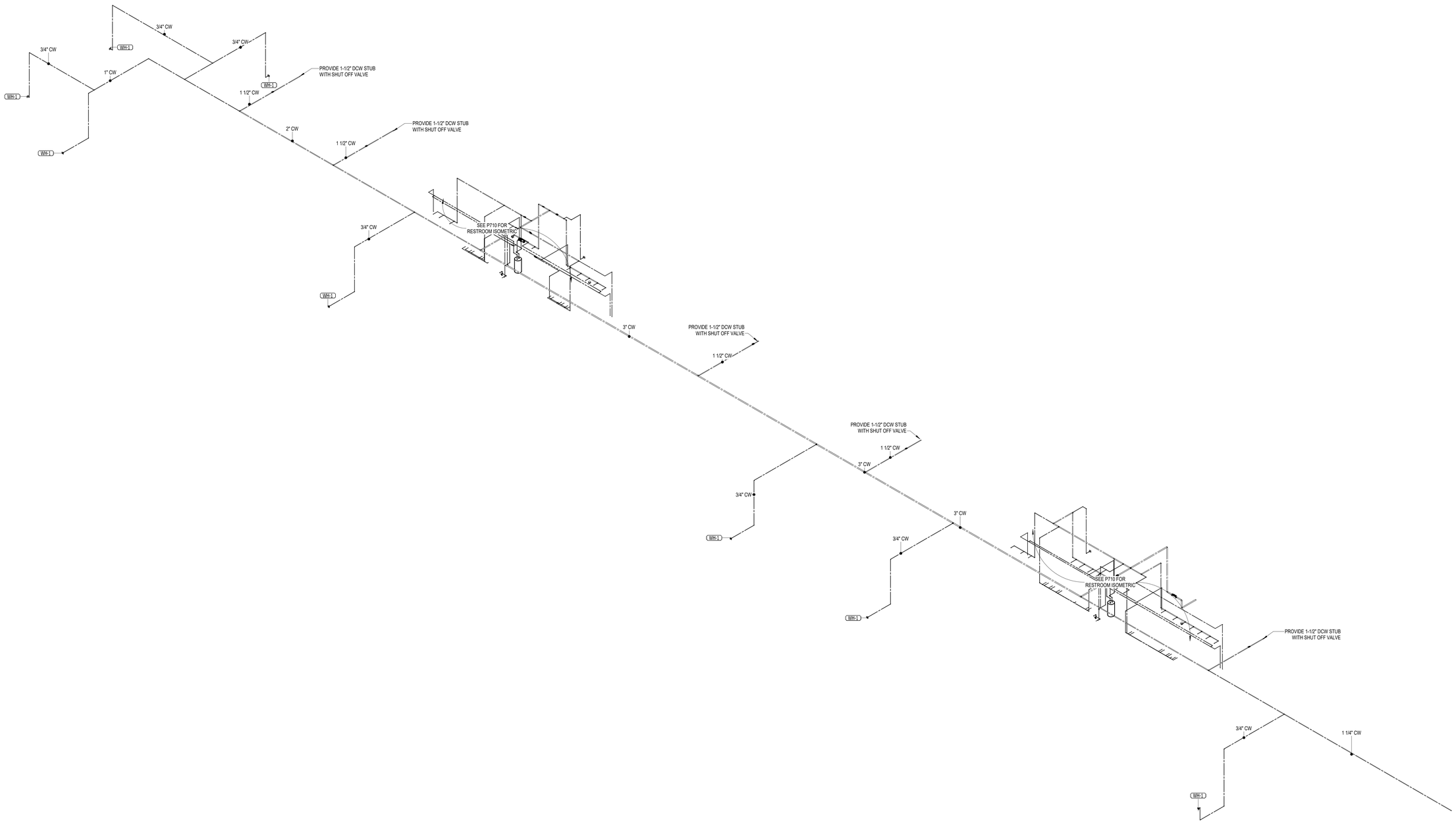

1 OVERALL PRESSURE ISOMETRIC

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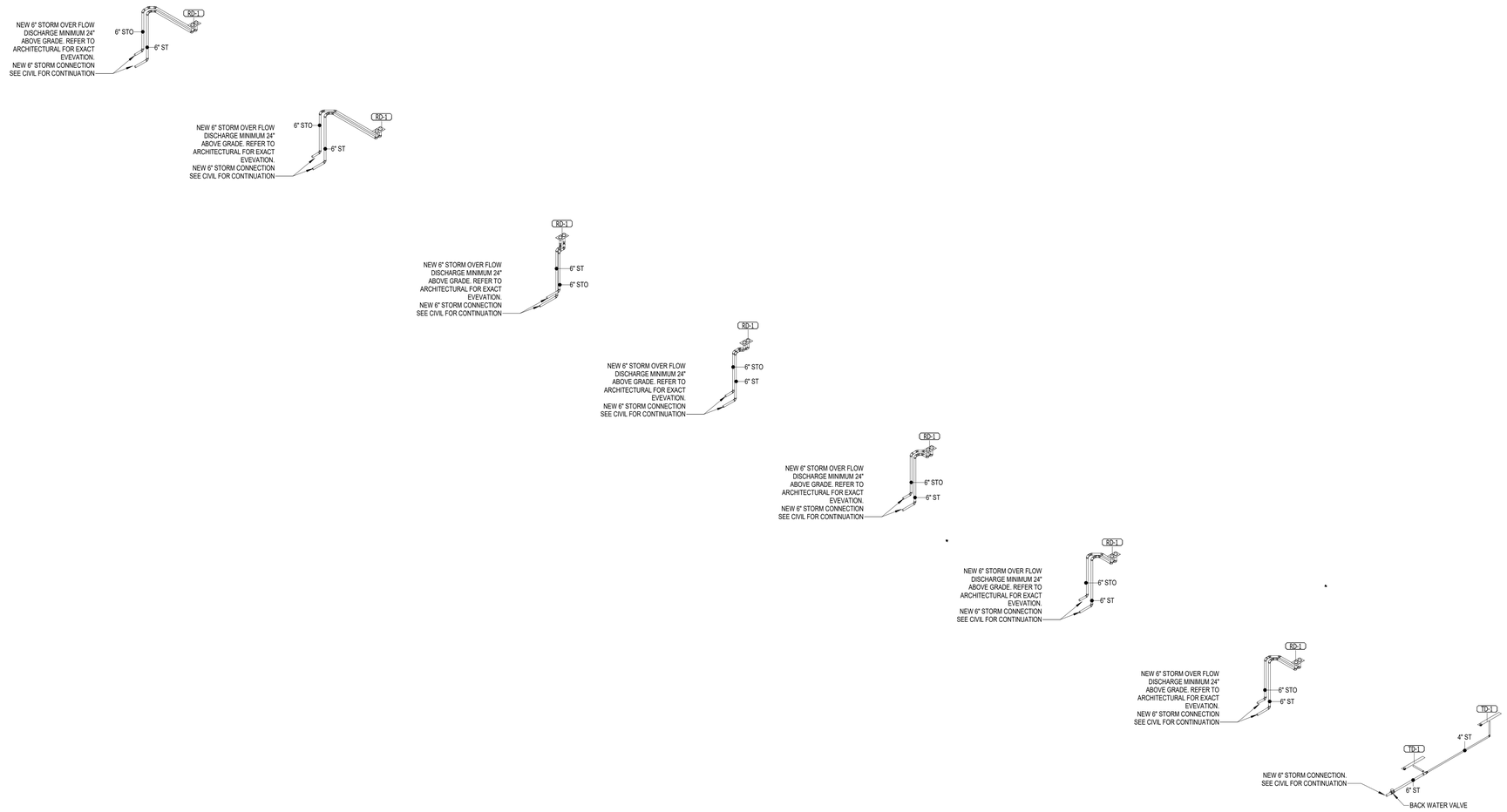

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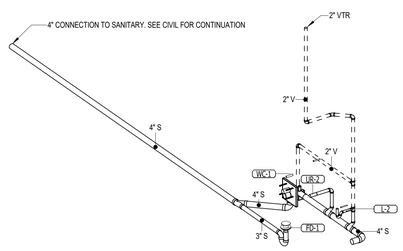

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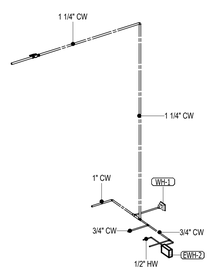

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SCOPE OF WORK:

1. THE SCOPE OF WORK SHALL INCLUDE THE LAYOUT,PROCUREMENT, INSTALLATION AND TESTING OF THE FOLLOWING FOR THE NEW BUILDING:
   A. AUTOMATIC WET-PIPE SPRINKLER SYSTEMS
   B. AUTOMATICALLY ACTIVATED FIXED WATER SPRAY SYSTEMS FOR EXTERIOR GLAZING PER NFPA 15.
2. SCOPE OF WORK BEGINS AT 5 FT. OUTSIDE THE FIRE RISER ROOM OF THE NEW BUILDING.

CLARIFICATIONS:

1. JENSEN HUGHES IS NOT RESPONSIBLE FOR THE WATER SUPPLY OR THE EFFECT EITHER MAY HAVE ON THE FIRE PROTECTION SPRINKLER SYSTEMS.
2. THESE DRAWINGS HAVE BEEN PROVIDED AS A BASIS OF DESIGN. IT IS THE RESPONSIBILITY OF THE FIRE SPRINKLER CONTRACTOR TO PREPARE FULLY COORDINATED SHOP DRAWINGS IN ACCORDANCE WITH NFPA 13 "WORKING DRAWINGS".
3. FIRE SPRINKLER CONTRACTOR SHALL PROVIDE LAYOUT OF THE SPRINKLER SYSTEM TO GIVE FULL CONSIDERATION TO BLIND SPACES, PIPING, ELECTRICAL EQUIPMENT, DUCTS, AND OTHER CONSTRUCTION AND EQUIPMENT. LOCATE SPRINKLERS IN A CONSISTENT PATTERN WITH THE CEILING AND CEILING GRID (WHERE PROVIDED), LIGHTS, AND AIR SUPPLY DIFFUSERS. SPRINKLERS SHALL BE LOCATED IN THE CENTER OF CEILING TILE WHERE TILE IS PROVIDED. DEVICES AND EQUIPMENT FOR FIRE PROTECTION SERVICE SHALL BE FM APPROVED FOR USE IN WET PIPE SPRINKLER SYSTEMS. ALL PARAMETERS GIVEN IN THESE DOCUMENTS SHALL BE STRICTLY CONFORMED TO. ANY ITEMS AND LABOR REQUIRED FOR A COMPLETE FIRE PROTECTION SYSTEM, IN ACCORDANCE WITH ALL APPLICABLE CODES, STANDARDS, LOCAL AUTHORITIES AND THESE CONTRACT DOCUMENTS SHALL BE FURNISHED WITHOUT INCURRING ANY ADDITIONAL COST TO THE OWNER. THE SPRINKLER CONTRACTOR SHALL CAREFULLY REVIEW ALL CONTRACT DOCUMENTS AND THE DESIGN OF OTHER TRADES AND SHOW SCENE PROPS BEFORE PREPARING SHOP DRAWINGS.
4. AFTER COMPLETION, BUT BEFORE FINAL ACCEPTANCE, FIRE SPRINKLER CONTRACTOR SHALL SUBMIT COMPLETE SET OF AS-BUILT DRAWINGS OF EACH SYSTEM FOR RECORD PURPOSES.
5. DESIGN OF THE DETECTION SYSTEM TO ACTIVATE THE DELUGE SYSTEMS IS BY OTHERS.

DESIGN CRITERIA:

1. DESIGN AND INSTALLATION ARE IN ACCORDANCE WITH 2013 NFPA 13, "STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS", 2013 NFPA 14, "STANDARD FOR THE INSTALLATION OF STANDPIPE AND HOSE SYSTEMS", 2013 NFPA 415 "STANDARD ON AIRPORT TERMINAL BUILDINGS, FUELING RAMP DRAINAGE, AND LOADING WALKWAYS", 2012 NFPA 15, "STANDARD FOR WATER SPRAY FIXED SYSTEMS FOR FIRE PROTECTION", FLORIDA BUILDING CODE 6TH EDITION, FLORIDA FIRE PREVENTION CODE 6TH EDITION, LOCAL ORDINANCES, AND AUTHORITIES HAVING JURISDICTION.
2. ALL CONTROL VALVES AND FLOW SWITCHES ON THE FIRE PROTECTION SYSTEM SHALL BE ELECTRICALLY SUPERVISED BY AN APPROVED CENTRAL STATION.
3. LIGHT HAZARD AREAS ARE HYDRAULICALLY CALCULATED AT A DENSITY OF .10 GPM/SQ.FT. OVER A REMOTE AREA OF 1,500 SQ.FT. INCLUDING 100 GPM FOR HOSE. LIGHT HAZARD AREAS SHALL INCLUDE OFFICE, RESTROOM, AND OTHER SIMILAR AREAS.
4. ORDINARY HAZARD GROUP I AREAS ARE HYDRAULICALLY CALCULATED AT A DENSITY OF .15 GPM/SQ.FT. OVER A REMOTE AREA OF 1,500 SQ.FT. AND INCLUDE 250 GPM FOR HOSE. ORDINARY HAZARD GROUP I AREAS SHALL INCLUDE MECHANICAL, ELECTRICAL, COMM., IDF, STORAGE, MAINT., FIRE RISER, HOLD ROOMS, QUEUE, SSCP AND OTHER SIMILAR AREAS. PASSENGER HANDLING AREAS SHALL BE CLASSIFIED AS ORDINARY HAZARD GROUP I PER NFPA 415.
5. ORDINARY HAZARD GROUP II AREAS ARE HYDRAULICALLY CALCULATED AT A DENSITY OF .20 GPM/SQ.FT. OVER A REMOTE AREA OF 1,500 SQ.FT. AND INCLUDE 250 GPM FOR HOSE. ORDINARY GROUP II HAZARD AREAS SHALL INCLUDE: CONCESSIONS AND OTHER SIMILAR AREAS.
6. HYDRAULIC CALCULATIONS SHALL INCLUDE A MINIMUM OF 5-PSI OR 10% SAFETY MARGIN,WHICHEVER IS GREATER AT THE FIRE HYDRANT FLOW TEST.
7. THE REDUCTION OF THE HYDRAULIC REMOTE AREA FOR QUICK RESPONSE SPRINKLERS IS NOT PERMISSIBLE.
8. PROVIDE FIXED WATER SPRAY SYSTEMS FOR ALL OF THE EXTERIOR GLAZING. SYSTEM TO PROVIDE A DENSITY OF .25 GPM/SQ.FT. OVER THE EXTERIOR SURFACE AREA OF THE WINDOW. MINIMUM PRESSURE PER SPRINKLER IS 20 PSI. ALL WINDOW SPRINKLERS TO BE CALCULATED.

CONTRACTOR:

1. THESE DOCUMENTS SHALL SERVE AS A BASIS FOR LAYOUT.
2. SEE CLARIFICATION NOTES ABOVE.
3. SPRINKLER CONTRACTOR SHALL VISIT JOB SITE WITH THESE DESIGN DOCUMENTS, AND THE PROJECT CONSTRUCTION DOCUMENTS, PRIOR TO BID AND BECOME FAMILIAR WITH FIELD CONDITIONS, AND TO IDENTIFY ANY COORDINATION CONFLICTS. NOTIFY ENGINEER OF RECORD WITH ANY CONFLICTS OR DISCREPANCIES OUTSIDE THIS DESIGN INTENT, PRIOR TO BID. ANY CHANGE ORDER REQUEST, AS A RESULT OF FIELD CONDITIONS, OR AS A RESULT OF LACK OF COORDINATION BETWEEN TRADES, WILL BE DENIED.
4. SPRINKLER CONTRACTOR SHALL OBTAIN ALL PERMITS REQUIRED FOR THE INSTALLATION AND TESTING OF FIRE SPRINKLER SYSTEM(S) INCLUDED IN THIS WORK-SCOPE, AND ADHERE TO ALL PERMIT, LICENSE AND GOVERNMENTAL REQUIREMENTS.
5. CONTRACTOR SHALL CONDUCT A WATER SUPPLY TEST PRIOR TO PREPARATION OF SHOP DRAWINGS, AND IMMEDIATELY NOTIFY ENGINEER OF RECORD, IN WRITING, OF THE TEST RESULTS.
6. CONTRACTOR SHALL SUBMIT A COMPLETE INSTALLATION PACKAGE TO THE ENGINEER FOR REVIEW AND APPROVAL, PRIOR TO MATERIAL REQUISITIONING AND FABRICATION. INCOMPLETE PACKAGES WILL NOT BE REVIEWED AND RETURNED AS REJECTED. THE INSTALLATION PACKAGE SHALL INCLUDE:
   A. INSTALLATION DRAWINGS WITH INSTALLATION INFORMATION PER 13;22.1.
   B. SITE PLAN WITH CURRENT UTILITY INFORMATION AND PERTINENT INFORMATION IN 13;22.1.
   C. HYDRAULIC CALCULATIONS.
   D. CURRENT WATER SUPPLY RESULTS (LESS THAN 1 YEAR OLD).
   E. MATERIAL SPECIFICATION BROCHURE.

6.1 AS A PART OF THE SHOP DRAWING PROCESS, DRAWINGS SHALL INDICATE ALL CEILING INFORMATION, INCLUDING, BUT NOT LIMITED TO: CEILING HEIGHTS, LIGHTING, MECHANICAL EQUIPMENT, OTHER CEILING MOUNTED EQUIPMENT. IN AREAS WITHOUT A DROP CEILING THE SHOP DRAWINGS SHALL INCLUDE THE STRUCTURE (INCLUDING IDENTIFICATION OF MEMBERS), LIGHTING, MECHANICAL, PLUMBING, ETC. OF ALL EQUIPMENT INSTALLED EXPOSED THAT IS TO BE COORDINATED WITH.

7. MATERIAL SPECIFICATION BROCHURE SHALL INCLUDE ALL SYSTEM COMPONENTS USED IN THE SYSTEM, TO THE WATER SOURCE, INCLUDING THE BACKFLOW PREVENTER FOR FRICTION LOSS VERIFICATION.
8. THE PROCUREMENT AND INSTALLATION OF NEW SYSTEM PIPING AND COMPONENTS IS PROHIBITED PRIOR TO THE SATISFACTORY REVIEW OF THE INSTALLATION PACKAGE BY THE ENGINEER.
9. FIRE SPRINKLER CONTRACTOR SHALL PROVIDE TO OWNER ALL LITERATURE AND INSTRUCTIONS PROVIDED BY THE MANUFACTURER DESCRIBING PROPER OPERATION AND MAINTENANCE OF ANY EQUIPMENT AND DEVICES INSTALLED, AND A COPY OF NFPA 25, "STANDARD FOR THE INSPECTION, TESTING, AND MAINTENANCE OF WATER-BASED FIRE PROTECTION SYSTEMS PER 10-4.
10. FIRE SPRINKLER CONTRACTOR SHALL INSTALL SYSTEM PIPING AND COMPONENTS IN A WORKMANSHIP LIKE MANNER. CHANGES IN INSTALLATION AS A RESULT OF POOR CRAFTSMANSHIP SHALL BE AS DIRECTED BY THE ARCHITECT, ENGINEER OR OWNER, AND SHALL BE AT NO ADDITIONAL COST TO THE OWNER.
11. THE INSTALLING CONTRACTOR SHALL ENSURE THE SPRINKLER SYSTEM IS COORDINATED WITH ALL OTHER TRADES AND BUILDING FEATURES. SPRINKLERS SHALL BE LOCATED IN ACCORDANCE WITH THE APPLICABLE SECTIONS OF NFPA 13 FOR OBSTRUCTIONS. THIS SHALL INCLUDED OBSTRUCTIONS TO SPRINKLER DISCHARGE OBSTRUCTIONS THAT PREVENT SPRINKLER DISCHARGE FROM REACHING THE HAZARD AND OBSTRUCTIONS TO SPRINKLER DISCHARGE PATTERN DEVELOPMENT. CONTRACTOR SHALL LOCATE SPRINKLERS AS REQUIRED TO ADHERE TO THESE REQUIREMENTS AND / OR PROVIDE ADDITIONAL SPRINKLERS AS NECESSARY TO COMPLY WITH THESE CODE SECTIONS.
12. SPRINKLERS SHALL BE INSTALLED UNDER FIXED OBSTRUCTIONS OVER 4 FT. IN WIDTH.

FDC NOTES:

1. FIRE DEPARTMENT CONNECTIONS SHALL BE EQUIPPED WITH CAPS TO PROTECT THE SYSTEM FROM THE ENTRY OF DEBRIS.
2. FIRE DEPARTMENT CONNECTIONS SHALL BE LOCATED NOT LESS THAN 457 MM (18 IN.) NOR MORE THAN 48 IN. ABOVE THE LEVEL OF THE ADJOINING GROUND, SIDEWALK, OR GRADE SURFACE. (NFPA 14, 6.4.6)

GENERAL NOTES:

1. DO NOT SCALE PLANS FOR THE PURPOSE OF ESTABLISHING DIMENSIONS.
2. NOT ALL PIPING, VALVES AND APPURTENANCES ARE SHOWN ON THE PLANS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE DETAIL, DESIGN AND INSTALLATION DOCUMENTS. REFER TO PLANS, NOTES AND DETAILS, AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.
3. FLOW AND SUPERVISORY SWITCH CONNECTIONS SHALL BE ACCOMPLISHED BETWEEN THE DIFFERENT RESPONSIBLE TRADES. ELECTRICAL WIRING CONNECTIONS TO ELECTRICAL FIRE PROTECTION DEVICES SHALL BE UNDER THE ELECTRICAL/FIRE ALARM DIVISION.
4. FIRESTOP ALL PENETRATIONS OF SMOKE/FIRE PARTITIONS. FIRE STOPPING SHALL BE OF U.L. LISTED ASSEMBLY.
5. SPRINKLER SYSTEM(S) SHALL BE DESIGNED FOR A MAXIMUM WORKING PRESSURE OF 175PSI PER 13;6.1.3.
6. PROVIDE SYSTEM(S) WITH FLUSHING CONNECTIONS PER 13;8.16.3.
7. SPRINKLER SYSTEM(S) SHALL BE HYDROSTATICALLY TESTED FOR TWO HOURS AT 200 PSI OR AT A PRESSURE OF 50 PSI IN EXCESS OF SYSTEM WORKING PRESSURE, WHICHEVER IS GREATER, PER 13;24.2.1.1.
8. ALL SPRINKLER PIPE AND FITTINGS SHALL BE SO INSTALLED THAT THE SYSTEM CAN BE DRAINED PER 13;8.16.2.1. PROVIDE ADDITIONAL DRAINS AS NECESSARY.
9. INSPECTORS TEST CONNECTIONS SHALL BE PROVIDED SO THAT THE WATER FLOW SWITCH CAN BE TESTED. CONNECTIONS SHALL BE LOCATED IN AN ACCESSIBLE LOCATION AND DISCHARGE TO AN APPROVED LOCATION. REFER TO DETAIL.
10. ALL VALVES SHALL HAVE A PERMANENTLY AFFIXED SIGN INDICATING ITS FUNCTION SECURED TO THE VALVE WITH SUITABLE CHAIN PER 13;6.7.4.
11. PROVIDE A PERMANENTLY ATTACHED HYDRAULIC NAMEPLATE STATING THE REQUIRED DESIGN CRITERIA FOR EACH DESIGNED SYSTEM PER 13;24.5.
12. PIPE HANGER MATERIAL, SPACING AND METHOD OF ATTACHMENT SHALL BE PER 13;9.1, AND MANUFACTURERS REQUIREMENTS.
13. MAINTAIN A MINIMUM OF 18" CLEARANCE BELOW SPRINKLER DEFLECTOR(S) AND ANY PERMANENT OR TEMPORARY OBSTRUCTION(S) PER 13;8.6.6.1.
14. AT LEAST SIX (6) SPARE SPRINKLER HEADS OF EACH TYPE, TEMPERATURE AND ORIFICE SIZE USED IN THE SYSTEM INCLUDING A SPECIAL WRENCH FOR EACH SPRINKLER HEAD SHALL BE KEPT IN A CABINET WHERE THE AMBIENT TEMPERATURE WILL AT NO TIME EXCEED 100" PER 13;6.2.9.1.

MATERIAL NOTES:

1. ONLY UL LISTED DEVICES AND MATERIALS SHALL BE INSTALLED THROUGHOUT THE SYSTEM.
2. ONLY NEW SPRINKLERS, AS NOTED, OR THEIR EQUAL, SHALL BE USED.
3. ALL WET-PIPE PIPING IN SIZES 1" THROUGH 2" SHALL BE SCH. 40, ASTM A-135 OR ANSI/ASTM A-53 BLACK STEEL PIPE, ASTM A-795, AND THREADED, UNLESS INDICATED OTHERWISE.
4. THE USE OF THREADABLE THINWALL PIPE, SUCH AS ALLIED "XL" OR "DYNA-THREAD", IS PROHIBITED.
5. ALL STEEL SPRINKLER PIPE SHALL HAVE A MINIMUM CORROSION RESISTANCE RATIO (CRR) OF 1.0.
6. ALL WET-PIPE IN SIZES 2-1/2" THROUGH 8" SHALL BE SCH. 10, ASTM A-135 OR ANSI/ASTM A-53 BLACK STEEL, AND/OR ASTM A-795, AND ROLL-GROOVED, UNLESS INDICATED OTHERWISE.
7. ALL THREADED PIPE AND FITTINGS SHALL HAVE THREADS CUT TO ASME B1.20.1, PIPE THREAD, GENERAL PURPOSE PER 13;6.5.1.1.
8. ALL SCH. 10 GROOVED BLACK STEEL PIPE SHALL BE ROLL-GROOVED.
9. PIPE JOINED WITH GROOVED FITTINGS SHALL BE JOINED BY A LISTED COMBINATION OF FITTINGS, GASKETS, AND GROOVES BY THE SAME MANUFACTURER. GROOVES SHALL BE DIMENSIONALLY COMPATIBLE WITH THE FITTINGS PER 13;6.5.3.2.
10. GROOVED FITTINGS SHALL BE MALLEABLE IRON ASTM A-47, DUCTILE IRON ASTM A-635, OR WELDED SEGMENT CARBON STEEL SCHEDULE 40 ASTM A-53. FINISH TO BE FACTORY PAINTED.
11. THREADED FITTINGS SHALL BE CAST IRON CLASS 125 OR 250 ANSI B16.4 OR MALLEABLE IRON CLASS 150 OR 300 ANSI B16.3., AND GALVANIZED WHERE NECESSARY OR REQUIRED.
12. WELDED OUTLETS SHALL BE ANSI B16.11 FORGED STEEL PER NFPA (UL LISTED) FOR WORKING PRESSURE TO 175PSI.
13. GALVANIZED PIPE AND FITTINGS TO BE USED IN ALL AREAS WHERE PIPE IS INSTALLED OUTSIDE OF THE BUILDING, SUCH AS DRAIN PIPING.
14. ALL FIXED SPRAY, DELUGE SYSTEM, PIPING AND FITTINGS TO BE INTERNALLY AND EXTERNALLY GALVANIZED.

INSTALLATION NOTES:

1. THE WELDING OF PIPE OR FITTINGS ON THE JOB SITE PREMISES IS PROHIBITED.
2. ALL PIPE LENGTHS ARE SHOWN CENTER-TO-CENTER UNLESS OTHERWISE NOTED.
3. ALL SPRINKLERS SHALL BE INSTALLED ACCORDING TO THEIR LISTINGS SPACING AND OBSTRUCTION REQUIREMENTS.
4. SPRINKLER DEFLECTORS SHALL BE INSTALLED PARALLEL TO ROOF/CEILING SLOPE PER 13;8.6.4.2.1, UNLESS OTHERWISE NOTED.
5. PIPE OR FITTINGS, AND COMPONENTS, INSTALLED IN CORROSIVE ATMOSPHERES, SUCH AS DRAIN PIPE OR HANGER ALL-THREAD ROD EXPOSED TO WEATHER CONDITIONS, SHALL BE GALVANIZED OR OTHER APPROVED CORROSION-RESISTIVE MATERIAL.
6. LOCATE SPRINKLER HEADS IN A CONSISTENT PATTERN WITH CEILING GRID, LIGHTS, AND SUPPLY AND RETURN AIR DIFFUSERS. FOR SPACES WITH LAY-IN TYPE CEILINGS, LOCATED SPRINKLERS IN CENTER OF TILE. THE DESIGN SHALL GIVE FULL CONSIDERATION TO BLIND SPACES, OTHER SYSTEM PIPING, ELECTRICAL EQUIPMENT, HVAC DUCTWORK, AND ALL OTHER TYPES OF OBSTRUCTIONS WHICH COULD PREVENT THE PROPER INSTALLATION AND OPERATION OF THE SPRINKLER SYSTEM.
7. THE NUMBER OF SPRINKLER SYSTEMS AND CONTROL VALVES SHALL NOT BE REDUCED FROM THAT SHOWN ON THESE DOCUMENTS.
8. SPRINKLERS IN AREAS WITH CEILING TILE SHALL BE INSTALLED CENTER OF TILE.
9. SPRINKLERS SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 13 FOR OBSTRUCTIONS. SPRINKLER PROTECTION SHALL BE PROVIDED BENEATH OBSTRUCTIONS, SUCH AS BUT NOT LIMITED TO; HVAC DUCTWORK OR ASSOCIATED EQUIPMENT.
10. SPRINKLER PIPING LOCATED INSIDE OF ROOMS SUCH AS ELECTRICAL, IDF, SWITCHGEAR, ATS/UPS AND MDF SHALL ONLY SERVE THAT ROOM. MAIN PIPING AND BULK SUPPLY PIPING SHALL NOT BE PIPED THROUGH SUCH ROOMS.
11. EXTERIOR WINDOWS FIXED SPRAY SYSTEM TO BE PROTECTED WITH MINIMUM K2.8 SPRINKLERS. BASIS OF DESIGN IS VIKING K3.0 MODEL C-1 WINDOW SPRINKLERS WITH 4 SPRINKLERS PER EACH SET OF 14FT OF WINDOWS.
12. ALL EQUIPMENT LOCATED OUTSIDE OF THE BUILDING TO BE CLEANED, PRIMED, AND PAINTED. COLOR AS PER ARCHITECT.

HANGER NOTES:

1. THE COMPONENTS OF HANGER ASSEMBLIES THAT DIRECTLY ATTACH TO THE PIPE OR TO THE BUILDING STRUCTURE SHALL BE UL LISTED.
2. HANGERS AND THEIR COMPONENTS SHALL BE FERROUS PER 9.1.1.5.1 UNLESS THE COMPONENTS HAVE BEEN PROVEN BY FIRE TESTS TO BE ADEQUATE FOR THE HAZARD APPLICATION, AND THAT ARE LISTED FOR THAT SERVICE PER 9.1.1.5.2.
3. SPRINKLER PIPING SHALL BE SUBSTANTIALLY SUPPORTED FROM THE BUILDING STRUCTURE, WHICH MUST SUPPORT THE ADDED LOAD OF THE WATER-FILLED PIPE PLUS A MINIMUM OF 250-POUNDS APPLIED AT THE POINT OF HANGING PER 9.2.1.3.1.
4. SPRINKLER PIPING OR HANGERS SHALL NOT BE USED TO SUPPORT NON-SYSTEM COMPONENTS PER 9.1.1.7.
5. BRANCHLINE AND MAIN HANGER LOCATION AND MAXIMUM DISTANCES SHALL MEET 9.2.2, TABLE 9.2.2.1, AND 9.2.4. ADDITIONALLY, THERE SHALL BE NOT LESS THAN ONE HANGER FOR EACH SECTION OF PIPE PER 9.2.3.2.1, UNLESS SPRINKLERS ARE SPACED LESS THAN 6-FT APART (9.2.3.2.2).
6. WALL MOUNTED SIDEWALL SPRINKLERS SHALL BE RESTRAINED TO PREVENT MOVEMENT.
7. THE HANGER CLOSEST TO THE SPRINKLER SHALL BE OF A TYPE THAT PREVENT UPWARD MOVEMENT OF THE PIPE PER 9.2.3.4.4.4., AND 9.2.3.5.2.2.
8. TRAPEZE HANGERS SHALL BE USED WHERE NECESSARY TO MEET THE ABOVE HANGING REQUIREMENTS TO TRANSFER LOADS TO APPROPRIATE STRUCTURAL MEMBERS. TRAPEZE HANGERS SHALL COMPLY WITH NFPA 13. SPRINKLER CONTRACTOR SHALL PROVIDE DETAILS OF SUCH HANGERS.
9. TRAPEZE HANGERS SHALL COMPLY WITH 9.1.1.6.
10. THREADED SECTIONS OF ROD SHALL NOT BE FORMED OR BENT PER 9.1.2.6.

FLORIDA 61-G NOTES

1. THESE DRAWINGS HAVE BEEN PROVIDED IN ACCORDANCE WITH THE FLORIDA ADMINISTRATIVE CODE 61G15-32. IT IS THE RESPONSIBILITY OF THE FIRE SPRINKLER CONTRACTOR TO PREPARE FULLY COORDINATED SHOP DRAWINGS IN ACCORDANCE WITH NFPA 13 "WORKING DRAWINGS".
2. DESIGN AND INSTALLATION SHALL BE IN ACCORDANCE WITH 2013 NFPA 13, "STANDARD FOR THE INSTALLATION OF SPRINKLER SYSTEMS", 2013 NFPA 24, "STANDARD FOR THE INSTALLATION OF PRIVATE FIRE SERVICE MAINS AND THEIR APPURTENANCES", 2013 NFPA 415, "STANDARD ON AIRPORT TERMINAL BUILDINGS, FUELING RAMP DRAINAGE, AND LOADING WALKWAYS", 2012 NFPA 15, "STANDARD FOR WATER SPRAY FIXED SYSTEMS FOR FIR PROTECTION", FLORIDA BUILDING CODE, 6TH EDITION (FBC), 6TH EDITION FLORIDA FIRE PREVENTION CODE (FFPC), LOCAL ORDINANCES AND AUTHORITY HAVING JURISDICTION.
3. THESE DRAWINGS ARE SCHEMATIC IN NATURE AND ARE NOT INTENDED TO SHOW ALL POSSIBLE CONDITIONS. IT IS INTENDED THAT A COMPLETE FIRE PROTECTION SYSTEM BE PROVIDED WITH ALL THE NECESSARY EQUIPMENT, APPURTENANCES AND CONTROLS, COMPLETELY COORDINATED WITH ALL DISCIPLINES. ALL PARAMETERS GIVEN IN THESE DOCUMENTS SHALL BE STRICTLY CONFORMED TO. ANY ITEMS AND LABOR REQUIRED FOR A COMPLETE FIRE PROTECTION SYSTEM, IN ACCORDANCE WITH ALL APPLICABLE CODES,STANDARDS, LOCAL AUTHORITIES AND THESE CONTRACT DOCUMENTS SHALL BE FURNISHED WITHOUT INCURRING ANY ADDITIONAL COST TO THE OWNER. THE SPRINKLER CONTRACTOR SHALL CAREFULLY REVIEW ALL CONTRACT DOCUMENTS AND THE DESIGN OF OTHER TRADES BEFORE PREPARING SHOP DRAWINGS
4. FIRE SPRINKLER CONTRACTOR SHALL PROVIDE LAYOUT OF THE SYSTEM TO GIVE FULL CONSIDERATION TO BLIND SPACES, PIPING, ELECTRICAL EQUIPMENT, DUCTS, AND OTHER CONSTRUCTION AND EQUIPMENT. LOCATE SPRINKLER HEADS IN A CONSISTENT PATTERN WITH THE CEILING AND CEILING GRID (WHERE PROVIDED), LIGHTS, AND AIR SUPPLY DIFFUSERS AND RETURN GRILLS.
5. JENSEN HUGHES' DESIGN RESPONSIBILITY STARTS AT 5 FT. OUTSIDE THE FIRE RISER ROOM OF THE NEW BUILDING. DESIGN OF THE DETECTION SYSTEM TO ACTIVATE THE DELUGE SYSTEM IS BY OTHERS.
6. JENSEN HUGHES HAS NO CONTROL OVER THE WATER SUPPLY'S QUALITY, OR AVAILABILITY, AND CANNOT GUARANTEE THAT THE RESULTS WILL REMAIN VALID FOR ANY LENGTH OF TIME.
7. REASONABLE EFFORTS HAVE BEEN MADE TO IDENTIFY WHETHER OR NOT WATER SUPPLY CONDITIONS EXIST THAT COULD LEAD TO MICROBIAL INFLUENCED CORROSION (MIC). ACCORDING TO THE DISCUSSIONS WITH THE OWNER, LOCAL WATER PURVEYOR AND THE FIRE OFFICIAL NO KNOWN ENVIRONMENTAL CONDITIONS THAT MIGHT BE RESPONSIBLE FOR MIC ARE FOUND IN THE WATER SUPPLY.
8. THE BACKFLOW PREVENTER AND METERING SPECIFICATIONS SHALL MEET OR EXCEED REQUIREMENTS OF THE LOCAL WATER PURVEYOR. THE BACKFLOW PREVENTER SHALL BE LISTED FOR FIRE PROTECTION USE.
9. THE WATER SUPPLY IS AS SHOWN ON THE CIVIL DRAWINGS.
10. THE POINT OF SERVICE FOR THE FIRE PROTECTION SYSTEM IS POINT WHERE THE UNDERGROUND IS USED FOR FIRE PROTECTION ONLY. THIS IS AT THE FIRE PROTECTION BACKFLOW PREVENTER AS NOTED.
11. A FIRE HYDRANT FLOW TEST WAS PERFORMED ON 07/02/2019 BY B&C FIRE SAFETY INC.. THE FLOW TEST HAD A STATIC PRESSURE OF 80 PSI, A RESIDUAL PRESSURE OF 55 PSI, AND A FLOW OF 1186 GPM.
12. ALL MATERIAL AND DEVICES SHALL BE UL LISTED. CONTRACTOR SHALL SUBMIT PRODUCT DATA FOR REVIEW PRIOR TO ANY INSTALLATION OR PROCUREMENT.
13. THE FIRE SPRINKLER SYSTEM CONTROL VALVES AND WATER FLOW SWITCHES SHALL BE CONNECTED TO THE BUILDING FIRE ALARM SYSTEM AND MONITORED BY A UL LISTED MONITORING STATION.
14. LIGHT HAZARD AREAS ARE HYDRAULICALLY CALCULATED AT A DENSITY OF .10 GPM/SQ.FT. OVER A REMOTE AREA OF 1,500 SQ.FT. INCLUDING 100 GPM FOR HOSE. LIGHT HAZARD AREAS SHALL INCLUDE OFFICE, RESTROOM, ENCLOSED STAIRS, AND OTHER SIMILAR AREAS.
15. ORDINARY HAZARD GROUP I AREAS ARE HYDRAULICALLY CALCULATED AT A DENSITY OF .15 GPM/SQ.FT. OVER A REMOTE AREA OF 1,500 SQ.FT. AND INCLUDE 250 GPM FOR HOSE. ORDINARY HAZARD GROUP I AREAS SHALL INCLUDE MECHANICAL, ELECTRICAL, COMM., IDF, STORAGE, MAINT., FIRE RISER, HOLD ROOMS, QUEUE, SSCP AND OTHER SIMILAR AREAS. PASSENGER HANDLING AREAS SHALL BE CLASSIFIED AS ORDINARY HAZARD GROUP I PER NFPA 415.
16. ORDINARY HAZARD GROUP II AREAS ARE HYDRAULICALLY CALCULATED AT A DENSITY OF .20 GPM/SQ.FT. OVER A REMOTE AREA OF 1,500 SQ.FT. AND INCLUDE 250 GPM FOR HOSE. ORDINARY GROUP II HAZARD AREAS SHALL INCLUDE: CONCESSIONS AND OTHER SIMILAR AREAS.
17. PROVIDE FIXED WATER SPRAY SYSTEMS FOR ALL OF THE EXTERIOR GLAZING. SYSTEM TO PROVIDE A DENSITY OF .25 GPM/SQ.FT. OVER THE EXTERIOR SURFACE AREA OF THE WINDOW. MINIMUM PRESSURE PER SPRINKLER IS 20 PSI. ALL WINDOW SPRINKLERS TO BE CALCULATED.

OKALOOSA COUNTY

FLY VPS

C19-2811-AP
Construction of Satellite Concourse 'C'

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AA-C002208
MLM JOB # TYPE PROPERTY

HAMID BAHADORI
LICENSED
No. 45138
11/30/2020
STATE OF FLORIDA
PROFESSIONAL ENGINEER

HAMID BAHADORI, P.E.
FL 45138

SEAL

Revisions

No.	Date	Description

JENSEN HUGHES
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www.jensenhughes.com
Project No.: 1HRB00660.000.000 EB-0007927

Project No.:	MLM-19672
Designed By:	CGB
Drawn By:	BHK
Checked By:	HRB
Issue Date:	30-NOV-2020
Drawing Scale:	N.T.S.

Drawing Title:

FIRE PROTECTION NOTES SHEET

BID DOCUMENTS

Drawing No.:

FP001

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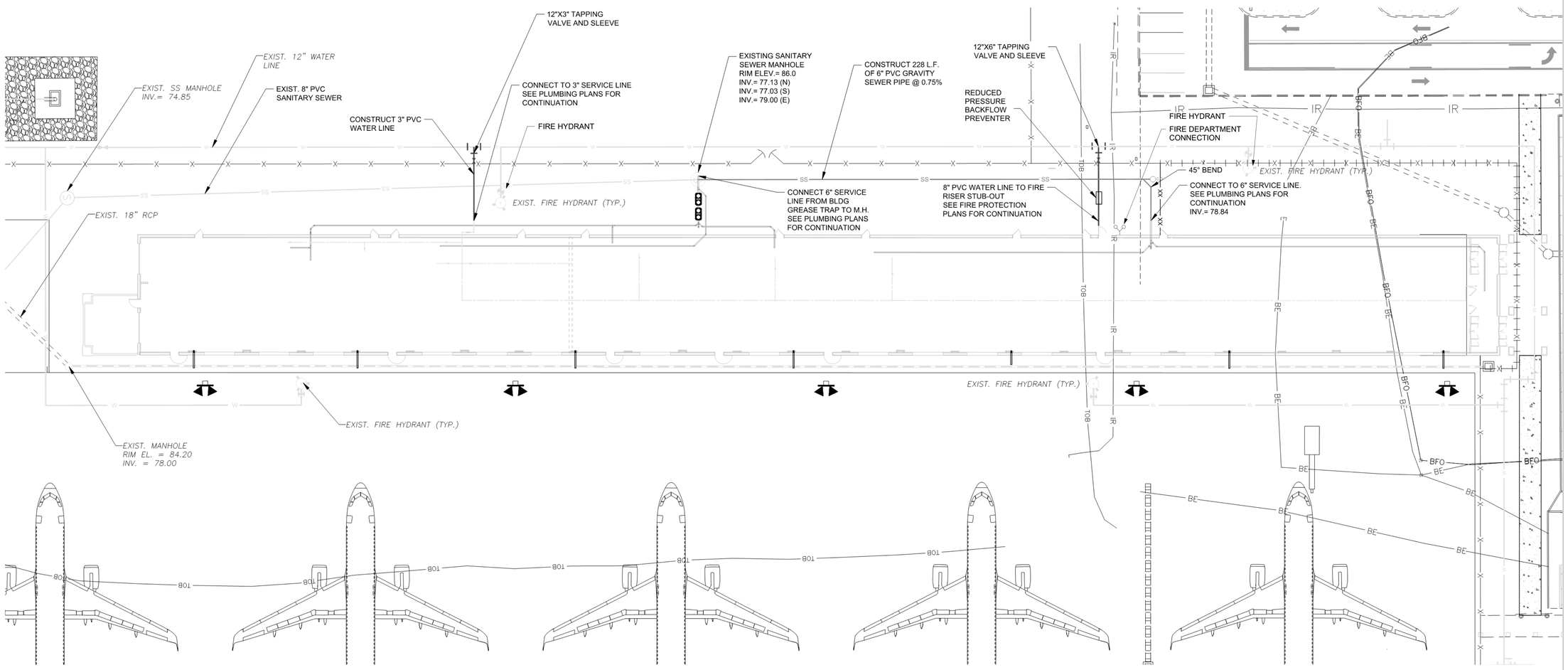

1 FIRE PROTECTION SITE PLAN

1" = 20'-0"

0 5' 10' 20' 40'

NORTH

SHEET NOTES

1. JENSEN HUGHES' DESIGN RESPONSIBILITY BEGINS 5 FT. FROM THE BUILDING. ALL WORK BEYOND IS THE RESPONSIBILITY OF THE CIVIL ENGINEER. REFER TO THE CIVIL UTILITY PLANS FOR ADDITIONAL INFORMATION.
2. JENSEN HUGHES HAS NO CONTROL OVER THE WATER SUPPLY'S QUALITY, OR AVAILABILITY, AND CANNOT GUARANTEE THAT THE RESULTS WILL REMAIN VALID FOR ANY LENGTH OF TIME.
3. THIS PLAN IS SHOWN FOR HYDRAULIC REFERENCE ONLY.
4. THE POINT OF SERVICE FOR THE FIRE PROTECTION SYSTEM IS THE POINT WHERE THE UNDERGROUND IS USED FOR FIRE PROTECTION ONLY. SEE SITE PLAN FOR LOCATION.

WATER SUPPLY DATA

STATIC PRESSURE:	80 PSI
RESIDUAL PRESSURE:	55 PSI
FLOW IN GPM:	1186
DATE OF TEST:	07/02/2019, 9AM
TEST TAKEN BY:	B&C FIRE SAFETY, INC.
LOCATION:	DESTIN/FWB AIRPORT NEAR SHERRIFF STATION

OKALOOSA COUNTY

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Drawn By:	BHK
Checked By:	HRB
Issue Date:	30-NOV-2020
Drawing Scale:	1" = 20'-0"

Drawing Title:

FIRE PROTECTION SITE PLAN

BID DOCUMENTS

Drawing No.:

FP002

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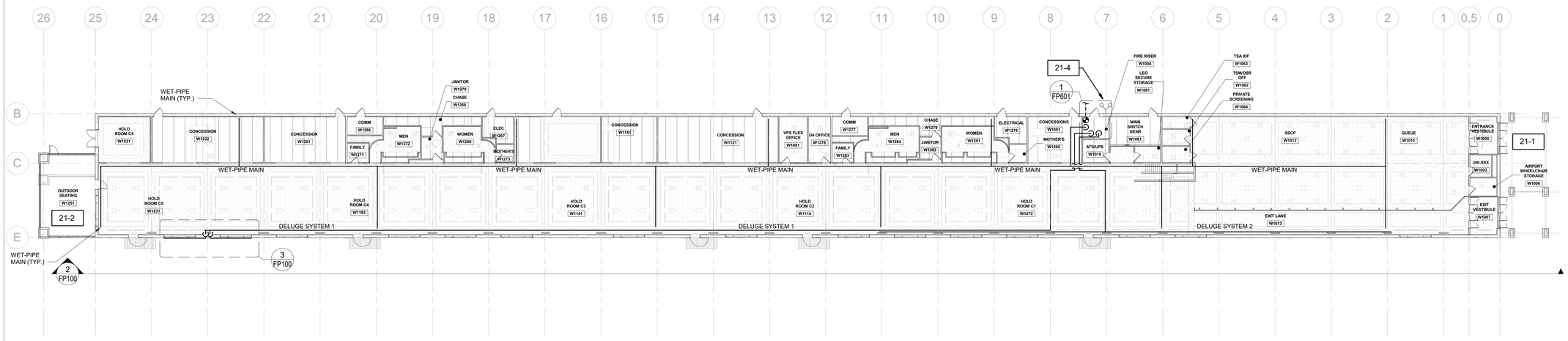
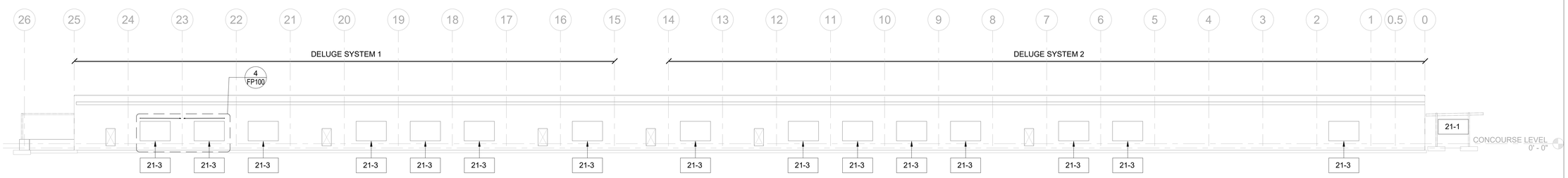


1 FIRE PROTECTION OVERALL FLOOR PLAN - LEVEL 1

1" = 20'-0"

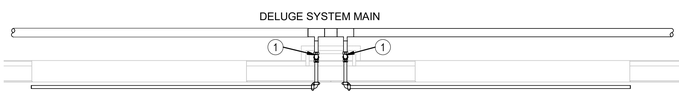
0 5' 10' 20' 40' NORTH



2 EXTERIOR WINDOW FIRE PROTECTION ELEVATION

1" = 20'-0"

0 5' 10' 20' 40' NORTH



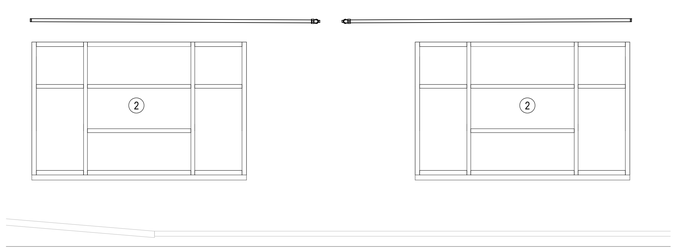
3 TYPICAL WINDOW PROTECTION PLAN

1/4" = 1'-0" THIS DETAIL TYPICAL TO ALL WINDOWS

0 1' 2' 4' 8'

WINDOW DETAIL NOTES:
(THIS DETAIL TYPICAL TO ALL WINDOWS)

1. PIPE TO BE INSTALLED IN WALL CAVITY.
2. 4 SPRINKLERS PER SET OF WINDOWS. SPRINKLERS TO BE INSTALLED PER MANUFACTURER'S REQUIREMENTS. (FIRE SPRINKLERS NOT SHOWN)



4 TYPICAL WINDOW PROTECTION SECTION

1/4" = 1'-0" THIS DETAIL TYPICAL TO ALL WINDOWS

0 1' 2' 4' 8'

KEY NOTES

21- #

21-1	EXTERIOR NON-COMBUSTIBLE CANOPY. NO STORAGE BENEATH. FIRE SPRINKLER PROTECTION NOT REQUIRED PER NFPA 13: 8.15.7.2, 8.15.7.5.
21-2	THIS AREA IS OPEN TO THE SKY. NO FIRE SPRINKLER PROTECTION.
21-3	PROVIDE DELUGE FIXED SPRAY SYSTEM WITH K3.0 SPRINKLERS. 4 SPRINKLERS PER WINDOW. INSTALL AS PER MANUFACTURER REQUIREMENTS.
21-4	WALL MOUNTED FDC.

GENERAL NOTES

1. AUTOMATIC WET-PIPE FIRE SPRINKLER PROTECTION TO BE PROVIDED THROUGHOUT THE ENTIRE BUILDING.
2. ALL SPRINKLERS TO BE OF THE CONCEALED QUICK RESPONSE TYPE IN PUBLIC AREAS INCLUDING: QUEUE, HOLD ROOMS, SSCP, BATHROOMS, CONCOURSE, ENTRANCE VESTIBULE, EXIT VESTIBULE. RECESSED SPRINKLERS ARE ACCEPTABLE IN BACK OF HOUSE AREAS SUCH AS OFFICES AND ELECTRICAL ROOMS WHERE DROP CEILING IS PROVIDED.
3. SPRINKLERS IN AREAS WITHOUT DROP CEILINGS SHALL BE INSTALLED ON BRANCHLINES WITH ONE-INCH OUTLETS AND REDUCERS TO ALLOW FUTURE MODIFICATION.
4. THE FIRE PROTECTION PIPING SHOWN IS DIAGRAMMATIC. THE FIRE SPRINKLER CONTRACTOR SHALL BE RESPONSIBLE FOR THE LAYOUT OF THE FIRE PROTECTION SYSTEMS. CONTRACTOR SHALL BE RESPONSIBLE FOR THE COORDINATION WITH OTHER TRADES AND WITH PROVIDING SUFFICIENT NUMBER OF MAINS IN LOCATIONS COORDINATED WITH OTHERS.

OKALOOSA COUNTY

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HAMID BAHADORI LICENSED No. 45138 11/30/2020 STATE OF FLORIDA PROFESSIONAL ENGINEER

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Drawn By:	BHK
Checked By:	HRB
Issue Date:	30-NOV-2020
Drawing Scale:	As indicated

Drawing Title:

FIRE PROTECTION FLOOR PLANS

BID DOCUMENTS

Drawing No.:

FP100

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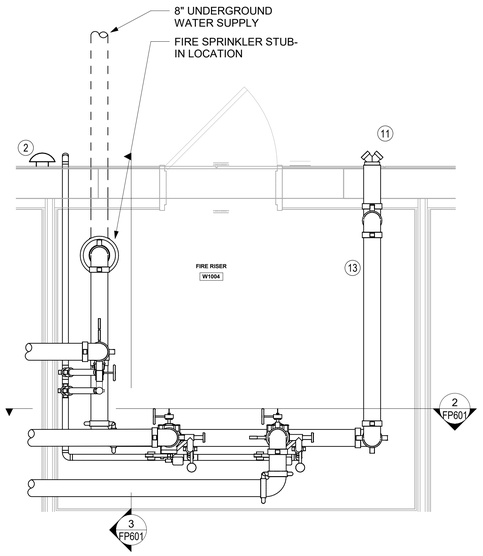
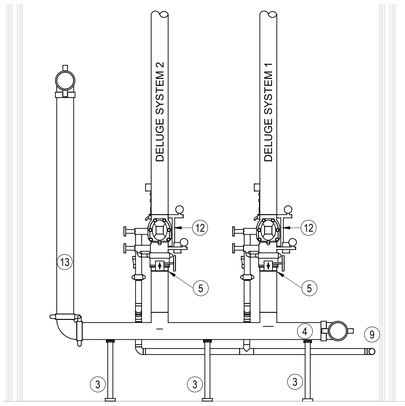


1 FIRE RISER ROOM

1/2" = 1'-0"

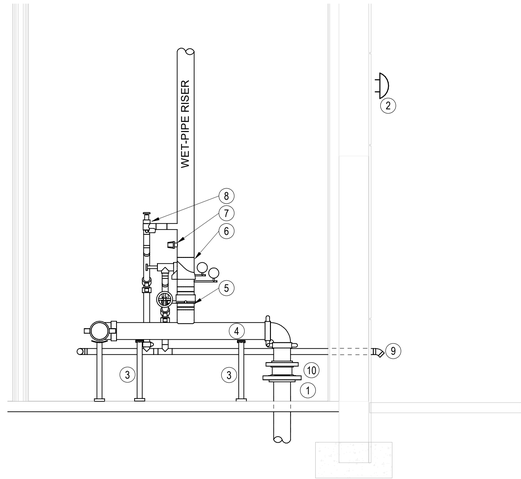
0 6" 12" 24" 48"



2 FIRE RISER ELEVATION A

1/2" = 1'-0"

0 6" 12" 24" 48"



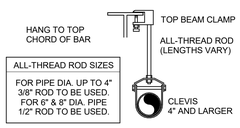
3 FIRE RISER ELEVATION B

1/2" = 1'-0"

0 6" 12" 24" 48"

SYMBOL LEGEND:

1. 8" UNDERGROUND STUB-IN
2. 10" ELECTRIC BELL 24VDC
3. 2" PIPE STAND (TYP.)
4. RISER MANIFOLD
5. UL LISTED BUTTERFLY VALVE WITH TAMPER
6. UL LISTED RISER CHECK VALVE WITH GAUGES AND MAIN DRAIN
7. UL LISTED WATER FLOW SWITCH
8. TEST AND DRAIN ASSEMBLY
9. DRAIN TO OUTSIDE
10. UL LISTED CHECK VALVE
11. WALL MOUNTED FDC WITH SIGNAGE
12. ELECTRIC RELEASE DELUGE VALVE WITH ALL REQUIRED TRIM
13. TO WALL MOUNTED FDC WITH CHECK VALVE. PIPE SIZE SAME AS MANIFOLD.



4 TBC AND CLEVIS

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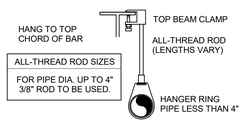

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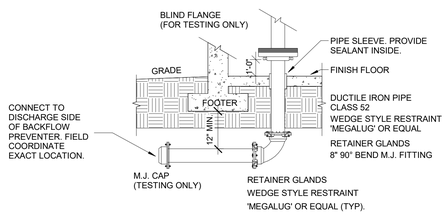

6 FIRE SPRINKLER STUB-IN DETAIL

N.T.S.

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Drawing Title:

FIRE PROTECTION DETAILS

BID DOCUMENTS

Drawing No.:

FP601

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GENERAL ELECTRICAL NOTES:

1. ELECTRICAL INSTALLATION SHALL COMPLY WITH THE FOLLOWING CODES AND STANDARDS:
   - NFPA 70 – NATIONAL ELECTRICAL CODE (NEC 2014)
   - NFPA 70E – STANDARD FOR ELECTRICAL SAFETY IN THE WORK PLACE
   - NESC – NATIONAL ELECTRICAL SAFETY CODE
   - IBC – INTERNATIONAL BUILDING CODE
   - IEEE – NATIONAL ELECTRICAL SAFETY CODE
   - NEIS – NATIONAL ELECTRICAL INSTALLATION STANDARDS
   - AHT - LOCAL AUTHORITY HAVING JURISDICTION
2. CONTRACTOR SHALL IN A WORKMANLIKE MANNER, PROVIDE A COMPLETE OPERABLE SYSTEM; OUTLINE DESCRIPTION AND DIAGRAMMATIC REPRESENTATION OF SYSTEM OPERATION AND EQUIPMENT DOESN'T LIMIT CONTRACTOR LIABILITY FOR INSTALLATION OF A COMPLETE AND OPERABLE SYSTEM.
3. ARCHITECTURAL FEATURES SHOWN ON THESE DRAWINGS ARE FOR BACKGROUND INFORMATION ONLY. REFER TO ARCHITECTURAL AND STRUCTURAL DRAWINGS FOR ACTUAL BUILDING CONSTRUCTION OF WALLS AND CURBS. REFER TO MECHANICAL DRAWINGS FOR ACTUAL LOCATIONS OF MECHANICAL EQUIPMENT.
4. THESE DRAWINGS ARE DIAGRAMMATIC IN NATURE AND INDICATE THE GENERAL ARRANGEMENTS OF THE VARIOUS SYSTEMS AND APPROXIMATE LOCATIONS OF THE EQUIPMENT. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO DETERMINE THAT THERE IS ADEQUATE SPACE AT THE LOCATIONS INDICATED FOR ALL EQUIPMENT PRIOR TO INSTALLATION OF SAME. THE CONTRACTOR SHALL BE RESPONSIBLE TO VERIFY ALL DIMENSIONS IN THE FIELD, PRIOR TO THE COMMENCEMENT OF CONSTRUCTION.
5. COORDINATE ALL WORK WITH OTHER DIVISION TRADES; COORDINATE AND OBTAIN ELECTRICAL SERVICE WITH LOCALELECTRIC UTILITY (EVERSOURCE); COORDINATE ALL REQUIRED POWER OUTAGES WITH THE RESPONSIBLE ENTITIES.
6. THE ELECTRICAL CONTRACTOR SHALL OBTAIN AND PAY FOR ANY NECESSARY PERMITS PRIOR TO BEGINNING OF WORK. AT COMPLETION OF THE WORK, THE ELECTRICAL CONTRACTOR SHALL ADJUST AND TEST ALL SYSTEMS AT THE DIRECTION OF THE OWNER AND OBTAIN AND DELIVER A FINAL CERTIFICATE OF APPROVAL FROM THE AUTHORITY HAVING JURISDICTION (AHJ).
7. CONTRACTOR SHALL ROUTE CONDUITS TO AVOID OBSTRUCTIONS AND PROVIDE ANY ADDITIONAL SUPPORT NECESSARY TO COMPLY WITH THE NEC.
8. CONTRACTOR SHALL INSTALL ALL ELECTRICAL EQUIPMENT WITH WORK SPACE CLEARANCE PER SECTION 110.26 OF THE NEC.
9. ALL CIRCUITS AND RACEWAYS SHALL INCLUDE AN EQUIPMENT GROUND CONDUCTOR (EGC). METALLIC RACEWAYS SHALL NOT BE USED AS AN EGC.
10. ALL BRANCH WIRING, DEVICES, JUNCTION BOXES, CONDUITS, EQUIPMENT, ETC. SHALL BE GROUNDED IN ACCORDANCE WITH THE NEC ARTICLE 250.
11. ALL EQUIPMENT SHALL BE LISTED BY UNDERWRITERS' LABORATORIES, INC. AND SHALL BEAR THE U.L. LABEL. PROVIDE ONLY NEW, UNDAMAGED EQUIPMENT.
12. CONDUIT INSTALLED INSIDE BUILDINGS SHALL BE ELECTRICAL METALLIC TUBING (EMT); CONDUIT INSTALLED OUTSIDE BUILDINGS SHALL BE RIGID GALVANIZED STEEL (RGS); CONDUIT INSTALLED UNDERGROUND SHALL BE RIGID POLY-VINYL CHLORIDE (PVC), SCHEDULE 40.
13. CONNECTION TO MOTOR COMPRESSOR AND VACCUM, TERMINAL BOXES, SOLENOID DEVICES HAVING ADJUSTABLE MOUNTING FACILITIES SUBJECT TO VIBRATION SHALL BE MADE IN LIQUID-TIGHT FLEXIBLE CONDUIT (LFC). A BONDING JUMPER SHALL BE PROVIDED WHENEVER A FLEXIBLE CONDUIT IS EMPLOYED.
14. ELECTRICAL CONNECTION TO ALL VIBRATING EQUIPMENT, SUCH AS MOTORS, COMPRESSORS, VACCUMES WITH ADJUSTABLE MOUNTING SHALL BE PROVIDED WHENEVER A FLEXIBLE CONDUIT IS EMPLOYED.
15. ALL WIRING METHODS SHALL ADHERE STRICTLY TO THE NEC. MINIMUM CONDUIT SIZE SHALL BE ¾"; MINIMUM WIRE SIZE SHALL BE #12AWG. ALL POWER CONDUCTORS INSULATION SHALL BE TYPE RHW, THW, THHW, THWN FOR 600V 75° TERMINATION AND THHN, THHW,THWN-2,RHW-2 FOR 600V 90° TERMINATION.
16. RACEWAYS IN ELECTRICALLY CLASSIFIED AREAS SHALL BE IN RIGID CONDUIT WITH SEALS.
17. ALL CIRCUITS ARE TO BE CLEARLY IDENTIFIED AND LABELED AT THE PANEL. PANEL SCHEDULES ARE TO BE TYPED AND SHALL BE COMPLETE AT TIME OF FINAL PUNCH LIST WALK THROUGH. ALL MAJOR PIECES OF ELECTRICAL EQUIPMENT SHALL BE LABELED WITH LAMINATE AND ENGRAVED LETTERING.
18. NO FEEDER OR BRANCH CIRCUIT WIRING SHOWN SHALL BE ALTERED OR CHANGED WITHOUT APPROVAL BY THE ENGINEER.
19. ALL CIRCUIT PROTECTIVE DEVICES SHALL HAVE THE REQUIRED RATING AND INTERRUPTING CAPACITY EQUAL TO OR GREATER THAN THE AVAILABLE SHORT-CIRCUIT CURRENT AT ITS SUPPLY TERMINAL; MINIMUM INTERRUPTING CAPACITY SHALL BE 10,000A. SYMMETRICAL A.I.C FOR 120/208V SYSTEMS, 120/240V SYSTEM AND 14,000A. SYMMETRICAL A.I.C FOR 277/480V SYSTEMS. REFER TO PANEL SCHEDULES FOR A.I.C RATINGS.
20. DURING CONSTRUCTION, THE CONTRACTOR SHALL MAINTAIN A RECORD SET OF INSTALLATION PRINTS. THE CONTRACTOR SHALL RECORD ON THESE PRINTS ALL DEVIATIONS FROM THE CONTRACT DRAWINGS IN CONDUIT SIZING, ELECTRICAL LOADS AND CIRCUITS. AT THE COMPLETION OF TE WORK, THE CONTRACTOR SHALL SUBMIT THESE PRINTS TO THE OWNER FOR INCORPORATION INTO THE FINAL RECORD DRAWINGS.

ELECTRICAL POWER LEGEND

SYMBOL	DESCRIPTION	SYMBOL	DESCRIPTION
	WALL OUTLET BOX AND 20 AMP SINGLE RECEPTACLE		NORMAL ELECTRICAL PANEL
	WALL OUTLET BOX AND 20 AMP DUPLEX RECEPTACLE		EMERGENCY ELECTRICAL PANEL
	TWO GANG WALL OUTLET BOX AND TWO 20 AMP DUPLEX RECEPTACLES		STANDBY ELECTRICAL PANEL
WP	WALL OUTLET BOX AND 20 AMP GFI DUPLEX RECEPTACLE WP INDICATES WEATHERPROOF		BRANCH CIRCUIT CONDUIT CONCEALED BELOW SLAB OR UNDERGROUND
IG	WALL OUTLET BOX AND 20 AMP ISOLATED GROUND DUPLEX RECEPTACLE (ORANGE DEVICE)	E	EMERGENCY SYSTEM BRANCH CIRCUIT CONDUIT, CONCEALED (LIFE SAFETY BRANCH)
UPS	WALL OUTLET BOX AND 20 AMP ISOLATED GROUND DUPLEX RECEPTACLE (ORANGE DEVICE). PLATE TO BE STAINLESS STEEL ENGRAVED TO READ "UPS POWER".	C	LEGALLY REQUIRED STANDBY SYSTEM BRANCH CIRCUIT CONDUIT, CONCEALED (CRITICAL BRANCH)
	WALL OUTLET BOX AND RECESSED 15 AMP CLOCK RECEPTACLE STAINLESS STEEL	O	OPTIONAL STANDBY SYSTEM BRANCH CIRCUIT CONDUIT, CONCEALED (EQUIPMENT BRANCH)
	JUNCTION BOX MOUNTED IN FLOOR FOR POWER FEED TO EQUIPMENT. COORDINATE LOCATION OF JUNCTION BOX WITH ASSOCIATED EQUIPMENT AND PROVIDE ALL FINAL CONNECTIONS.	IG	ISOLATED POWER SYSTEM CONDUIT, CONCEALED
	PULLBOX OR MANHOLE, AS NOTED.	UPS	UNINTERUPTABLE POWER SYSTEM BRANCH CIRCUIT WITH ISOLATED GROUND ON EMERGENCY SYSTEM (LIFE SAFETY BRANCH)
0.5	MOTOR. NUMBER INDICATES HORSEPOWER	PP-1: 1,3,5	HOMERUN TO PANEL INDICATES BRANCH CIRCUIT(S) INDICATES PANELBOARD
R	RELAY, AS NOTED		CONDUIT CAPPED OFF
	PHOTO CELL		CONDUIT CONTINUED
	METER, AS NOTED		CONDUIT RUN UP
	HEATER/ELECTRICAL RESISTANCE, AS NOTED		CONDUIT RUN DOWN
	BUSBAR		CONDUIT SEAL-OFF FITTING
	MAGNETIC MOTOR STARTER, MOTOR CONTROLLER OR CONTACTOR, AS NOTED	G	GROUND WIRE, CONCEALED
	DISCONNECT SWITCH, SIZE AS NOTED		GROUND OR GROUND ROD AS NOTED
	DISCONNECT SWITCH FUSED, SIZE AS NOTED		AIR TERMINAL
	MOTOR STARTER/DISCONNECT SWITCH, SIZE AS NOTED		THERMAL MAGNETIC CIRCUIT BREAKER
T	TRANSFORMER		MOTOR OVERLOADS
ATS	AUTOMATIC TRANSFER SWITCH		GROUND ROD
	CONTACTOR, FULL VOLTAGE NON-REVERSING		TELE/POWER POLE
	DUAL ELEMENT TIME DELAY FUSE (DETD)		SPECIAL SINGLE RECEPTACLE - TYPE 5-20R UNLESS OTHERWISE NOTED
	FUSED DISCONNECT SWITCH HEAVY DUTY, NEMA TYPE 1 ENCLOSURE, UNLESS OTHERWISE INDICATED. DUAL ELEMENT TIME DELAY FUSE		
	FLOOR MOUNTED OUTLET BOX WITH 20 AMP DUBLEX RECEPTACLE		

ELECTRICAL LIGHTING LEGEND

SYMBOL	DESCRIPTION
A a	LIGHTING FIXTURE • A - FIXTURE TYPE • a - SWITCH OR CONTROL CIRCUIT • HALF SHADED INDICATES EMERGENCY CIRCUIT
S	WALL SWITCH, SINGLE POLE, SINGLE THROW, 20A, 120/277V. WALL MOUNT 48" AFF TO CENTERLINE OF DEVICE. LETTER INDICATES LIGHT FIXTURES CONTROLLED IF GIVEN WITH BRUSHED STAINLESS STEEL FACEPLATE AND OF COMMERCIAL GRADE. 'D' INDICATES DIMMING CONTROL SWITCH. 'OS' INDICATES OCCUPANCY SENSOR.
S^{a}_{OS}	WALL SWITCH, SINGLE POLE, SINGLE THROW, 20A, 120/277V. WALL MOUNT 48" AFF TO CENTERLINE OF DEVICE. LETTER INDICATES LIGHT FIXTURES CONTROLLED IF GIVEN WITH BRUSHED STAINLESS STEEL FACEPLATE AND OF COMMERCIAL GRADE. 'D' INDICATES DIMMING CONTROL SWITCH. 'OS' INDICATES OCCUPANCY SENSOR.
S_3	3-WAY WALL SWITCH, 20A, 120/277V. WALL MOUNT 48" AFF TO CENTERLINE OF DEVICE WITH BRUSHED STAINLESS STEEL FACEPLATE AND OF COMMERCIAL GRADE.
S_{M3}	MOTOR RATED MANUAL STARTER SWITCH. WALL MOUNT 48" AFF TO CENTERLINE OF DEVICE. INDICATES NUMBER OF POLES (1-POLE IF NOT INDICATED).

SINGLE LINE LEGEND

SYMBOL	DESCRIPTION
	CIRCUIT BREAKER
	TRANSFORMER
	MOTOR
M	ELECTRICAL METER
	CURRENT TRANSFORMER
N O/I E	MANUAL TRANSFER SWITCH
VFD	VARIABLE-FREQUENCY DRIVE
	DISCONNECT SWITCH

ELECTRICAL ABBREVIATIONS

(E)	EXISTING TO REMAIN
(R)	REMOVE
(RE)	RELOCATE EXISTING
A	AMPERE
AC	ALTERNATING CURRENT
ACH	ABOVE COUNTER HEIGHT
ADA	AMERICANS WITH DISABILITIES ACT
AF	AMPERE FRAME
AFC	ABOVE FINISHED CEILING
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHU	AIR HANDLING UNIT
AL	ALUMINUM
AMP	AMPERE
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
AT	AMPERE TRIP
AWG	AMERICAN WIRE GAUGE
BAS	BUILDING AUTOMATION SYSTEM
BICSI	BUILDING INDUSTRY CONSULTING SERVICE INTERNATIONAL, INC
BLDG	BUILDING
BLR	BOILER
C	CONDUIT
CAT	CATEGORY
CB	CIRCUIT BREAKER
CD	CANDELA
CKT	CIRCUIT
CLG	CEILING
CND	CONDUIT
COMM	COMMUNICATION
CU	COPPER
dB	DECIBEL
DISP.	DISPLAY
DP	DISTRIBUTION PANEL
EC	ELECTRICAL CONTRACTOR
ELP	EMERGENCY LIGHTING PANEL
EMT	ELECTRICAL METALLIC TUBING
ERP	EMERGENCY RECEPTACLE PANEL
FIDS	FLIGHT INFORMATION DISPLAY SYSTEM
FLA	FULL LOAD AMPS
FLMC	FLEXIBLE LIQUIDTIGHT METALLIC CONDUIT
FMC	FLEXIBLE METALLIC CONDUIT
G,GND	GROUND
GC	GENERAL CONTRACTOR
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
HP	HORSE POWER
JB	JUNCTION BOX
KVA	KILOVOLTAMPERE
KW	KILOWATT
LCP	LIGHTING CONTROL PANEL
LP	LIGHTING PANEL
LPS	LOCKED POWER SUPPLY
LTG	LIGHTING
MC	MECHANICAL CONTRACTOR
MCB	MAIN CIRCUIT BREAKER
MLO	MAIN LUG ONLY
MTD	MOUNTED
NEC	NATIONAL ELETRICAL CODE
OPS	OPERATIONS
P	POLE
PCAIR	PRE COMPRESSED AIR
PH	PHASE
PP	POWER PANEL
PVC	POLYVINYL CHLORIDE
REC	RECEPTACLE
RGS	RIGID GALVANIZED STEEL
RM	ROOM
RP	RECEPTACLE PANEL
RVS	REDUCED VOLTAGE STARTER
SCH	SCHEDULE
SHD	MOTORIZED SHADES
SPD	SURGE PROTECTIVE DEVICE
SPEC	SPECIFICATION
STP	SHIELDED TWISTED PAIR
SW	SWITCH
TEMP	TEMPORARY
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
V	VOLT
VFD	VARIABLE FREQUENCY DRIVE
W	WATT
XFMR	TRANSFORMER

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Revisions

No.	Date	Description

Project No.:	Project Number
Designed By:	BA
Drawn By:	
Checked By:	CMC
Issue Date:	30-NOV-2020
Drawing Scale:	

Drawing Title:

ELECTRICAL LEGENDS, NOTES & ABBREVIATIONS

BID DOCUMENT

Drawing No.:

E000

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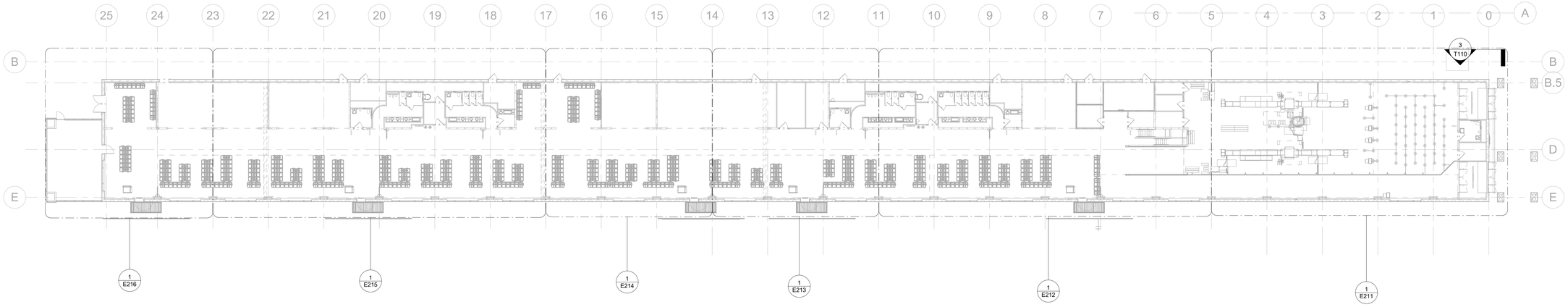
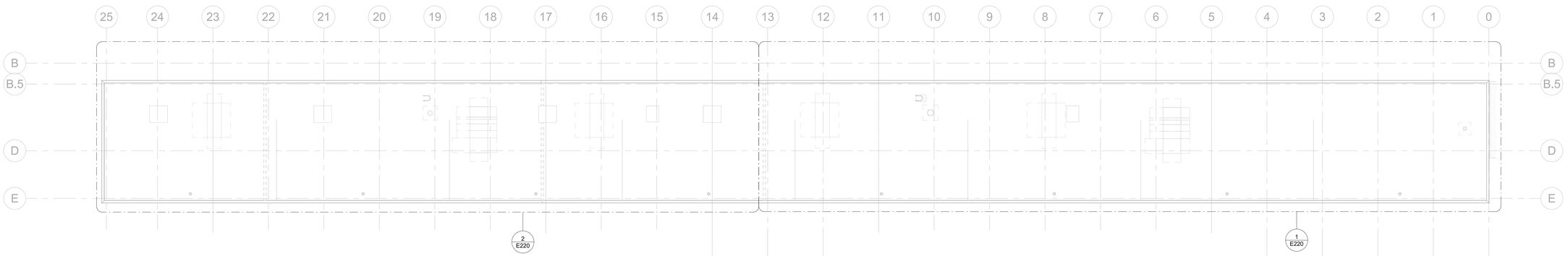
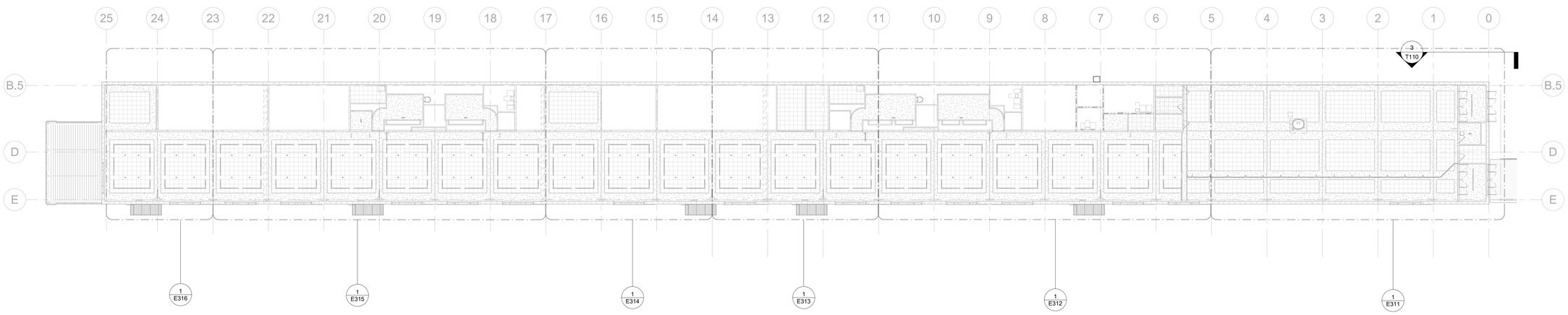


1 LEVEL 1 - POWER OVERALL
1" = 20'-0"



2 ROOF - POWER - OVERALL
1" = 20'-0"



3 LEVEL 1 - LIGHTING OVERALL
1" = 20'-0"

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Project No.:	**Project Number**
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Drawn By:	
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Issue Date:	**30-NOV-2020**
Drawing Scale:	

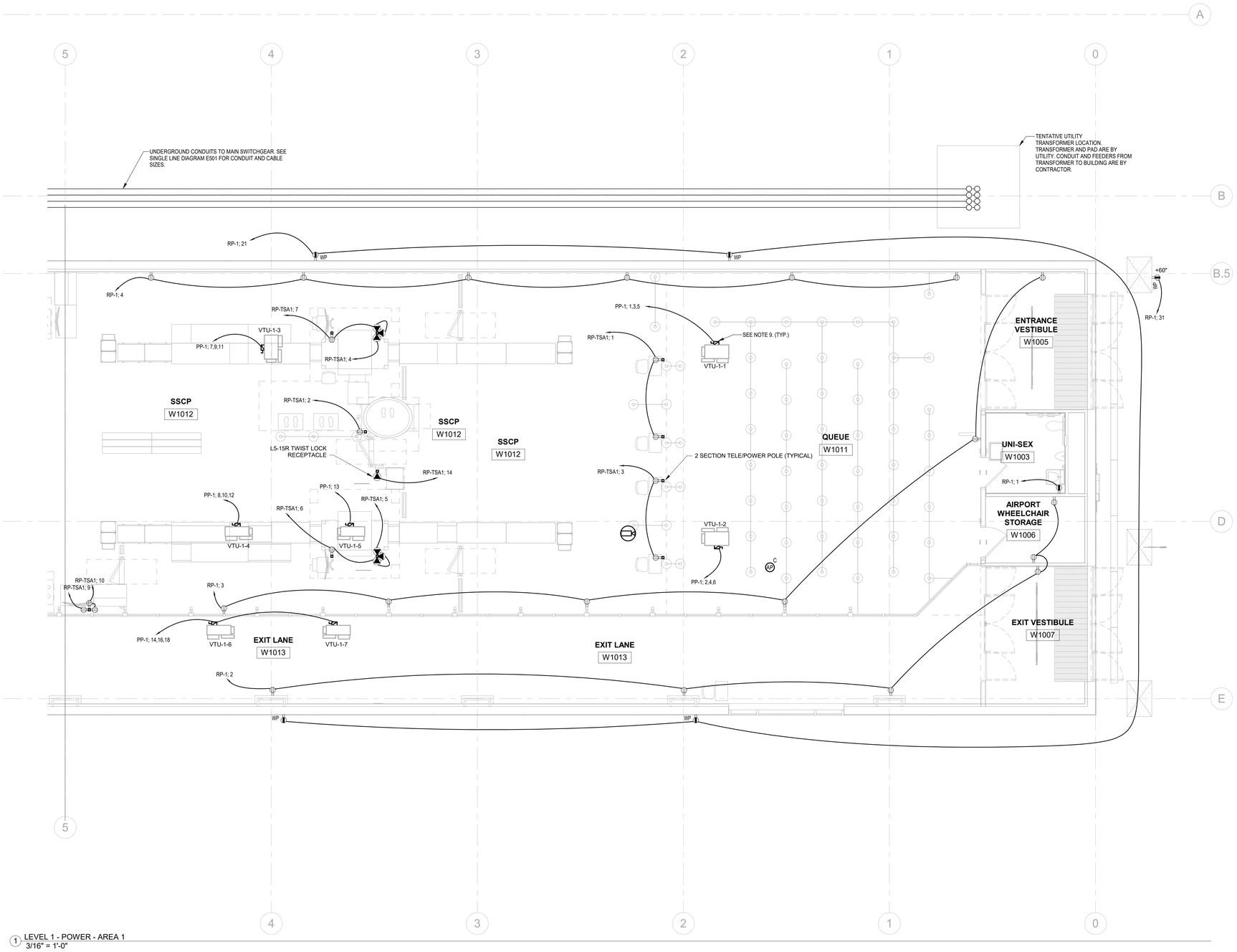
Drawing Title:

OVERALL
ELECTRICAL
FLOOR PLANS

BID DOCUMENT

Drawing No.:

E110



1 LEVEL 1 - POWER - AREA 1
3/16" = 1'-0"

GENERAL ELECTRICAL NOTES:

1. SEE SHEET E000 FOR ELECTRICAL LEGEND, SYMBOLS, GENERAL NOTES & ABBREVIATIONS.
2. SEE SHEETS E601-E603 FOR SWITCHBOARD AND PANEL SCHEDULES.
3. SEE SHEET E604 FOR LIGHTING FIXTURE SCHEDULE.
4. SEE SHEET E801 FOR ELECTRICAL DETAILS.
5. REFER TO MECHANICAL DRAWINGS FOR MORE DETAILS ON HVAC EQUIPMENT.
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8. ALL OUTDOOR ELECTRICAL EQUIPMENT SHALL BE NEMA 3R.
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10. COORDINATE MUFIDS RECEPTACLE MOUNTING HEIGHT WITH ARCHITECTURAL DRAWINGS.

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Revisions

No.	Date	Description

Project No.:	Project Number
Designed By:	CMC
Drawn By:	JJS
Checked By:	JB
Issue Date:	30-NOV-2020
Drawing Scale:	

Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 1

BID DOCUMENT

Drawing No.:

E211

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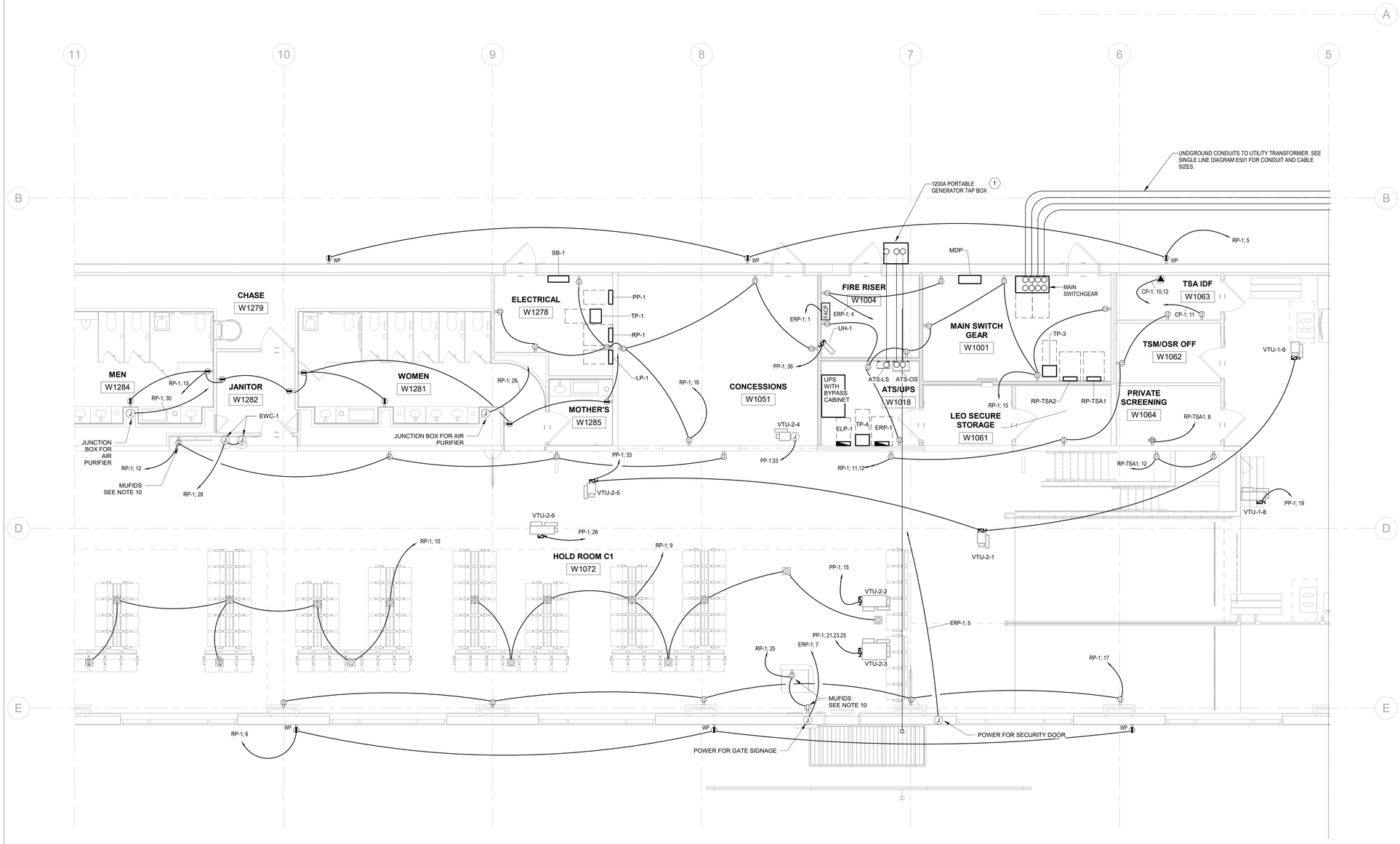

1 LEVEL 1 - POWER - AREA 2
3/16" = 1'-0"

GENERAL ELECTRICAL NOTES:

1. SEE SHEET E000 FOR ELECTRICAL LEGEND, SYMBOLS, GENERAL NOTES & ABBREVIATIONS.
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KEYED NOTES

1	PROVIDE TAP BOX WITH NEMA 3R RATING. MOUNT ON PAD. PROVIDE ADDITIONAL LUGS FOR CONNECTION ON INTERIOR TO (2) MANUAL TRANSFER SWITCHES AS SHOWN ON SINGLE LINE DIAGRAM ON E501. PROVIDE PHASE ROTATION MONITOR KIT. PROVIDE POWERTRON 1200A UNIT OR APPROVED EQUAL. PROVIDE KIRK KEY INTERLOCK FEATURE WITH CONNECTION TO KIRK KEY AT SWITCHBOARD MAIN CIRCUIT BREAKER SO THAT ONLY ONE SOURCE CAN PROVIDE POWER TO THE BUILDING AT A TIME.

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Issue Date:	30-NOV-2020
Drawing Scale:	As indicated

Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 2

BID DOCUMENT

Drawing No.:

E212

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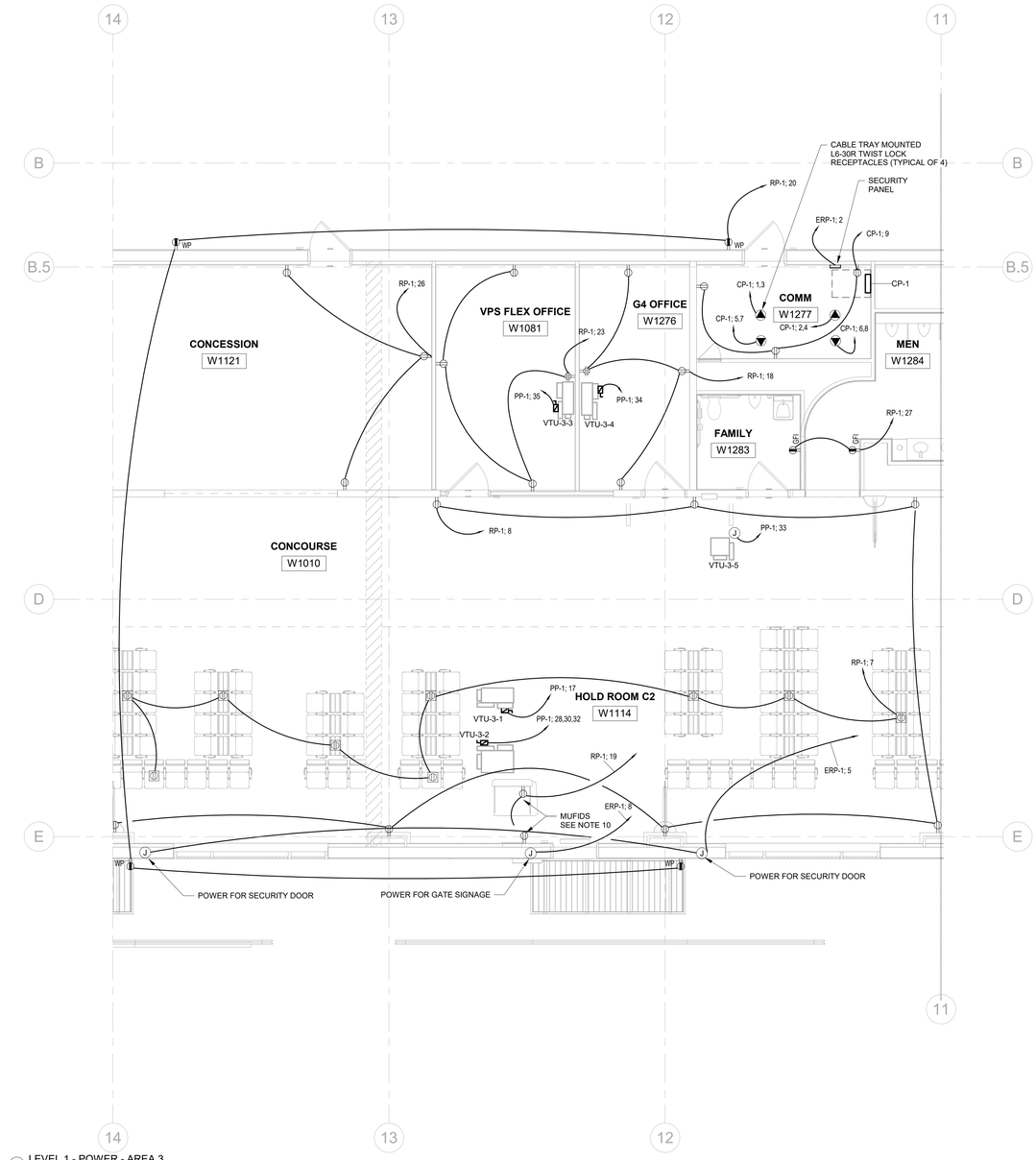

1 LEVEL 1 - POWER - AREA 3
3/16" = 1'-0"

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Revisions

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Key Plan

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Drawn By:	
Checked By:	**CMC**
Issue Date:	**30-NOV-2020**
Drawing Scale:	

Drawing Title:
ENLARGED FLOOR PLAN LEVEL 1 - AREA 3
DESIGN DEVELOPMENT

Drawing No.:
E213

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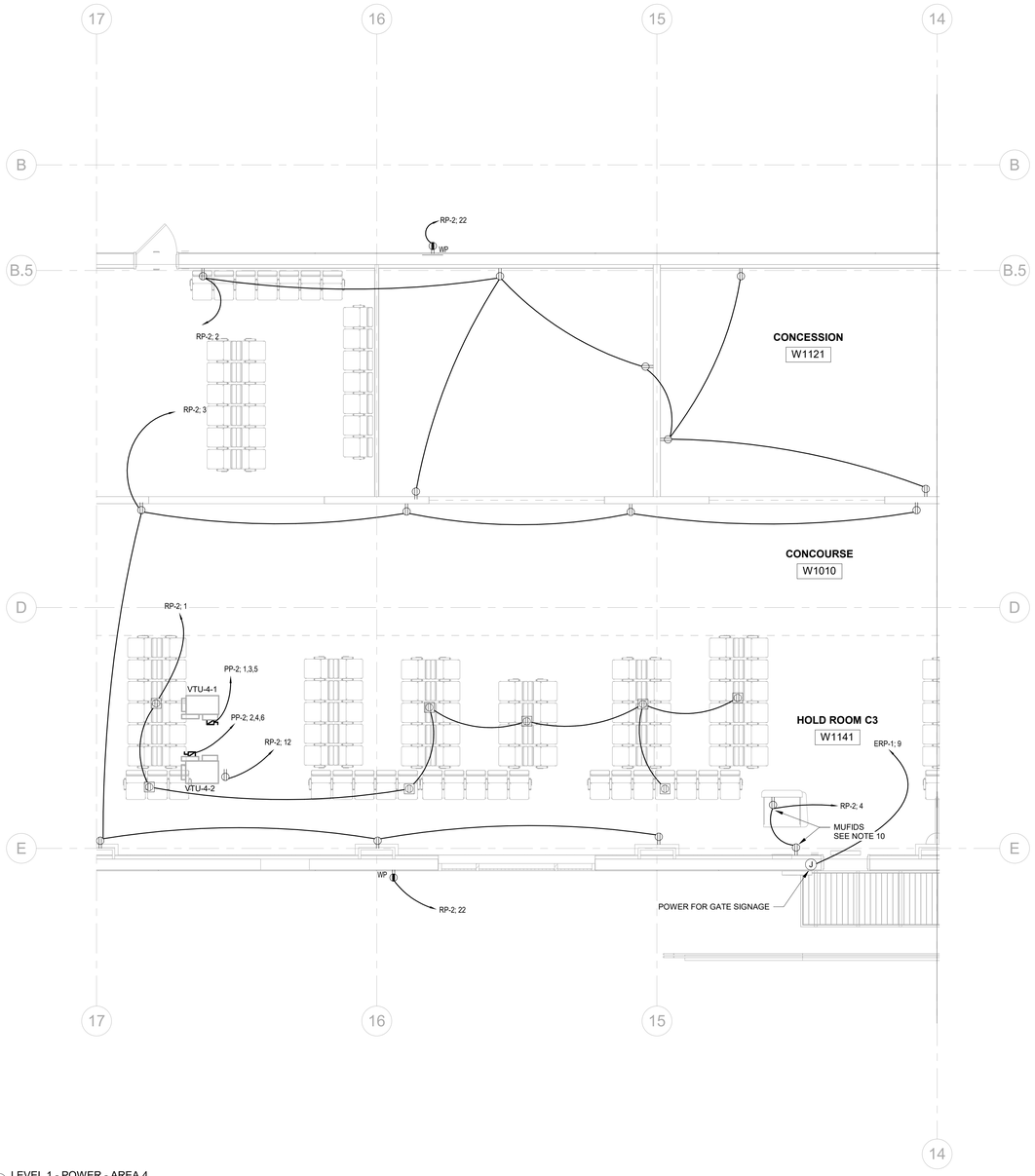

1 LEVEL 1 - POWER - AREA 4
3/16" = 1'-0"

GENERAL ELECTRICAL NOTES:

1. SEE SHEET E000 FOR ELECTRICAL LEGEND, SYMBOLS, GENERAL NOTES & ABBREVIATIONS.
2. SEE SHEETS E601-E603 FOR SWITCHBOARD AND PANEL SCHEDULES.
3. SEE SHEET E604 FOR LIGHTING FIXTURE SCHEDULE.
4. SEE SHEET E801 FOR ELECTRICAL DETAILS.
5. REFER TO MECHANICAL DRAWINGS FOR MORE DETAILS ON HVAC EQUIPMENT.
6. FOR THE ACTUAL SERVICE ENTRANCE RUNS AND LOCATION OF PROPOSED GULF POWER UTILITY TRANSFORMER PAD, REFER TO THE CIVIL DRAWINGS PACKAGE.
7. ELECTRICAL CONTRACTOR SHALL FURNISH AND INSTALL 480V CABLES FROM THE SECONDARY SIDE OF THE SERVICE TRANSFORMERS TO THE MAIN SWITCHGEAR IN THE MAIN ELECTRICAL ROOM.
8. ALL OUTDOOR ELECTRICAL EQUIPMENT SHALL BE NEMA 3R.
9. VAV TERMINAL UNIT INTEGRAL FUSED DISCONNECT SWITCH PROVIDED BY UNIT MANUFACTURER.
10. COORDINATE MUFIDS RECEPTACLE MOUNTING HEIGHT WITH ARCHITECTURAL DRAWINGS.

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AA-C002208
MLM JOB # TYPE PROPERTY

JOHN E. BURNS
LICENSE
No 62139
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

SEAL

Revisions

No.	Date	Description

Project No.:	Project Number
Designed By:	BA
Drawn By:	
Checked By:	CMC
Issue Date:	30-NOV-2020
Drawing Scale:	

Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 4

BID DOCUMENT

Drawing No.:

E214

BIM 360://Design of Satellite Concourse\VPS_ETSTCFA.rvt

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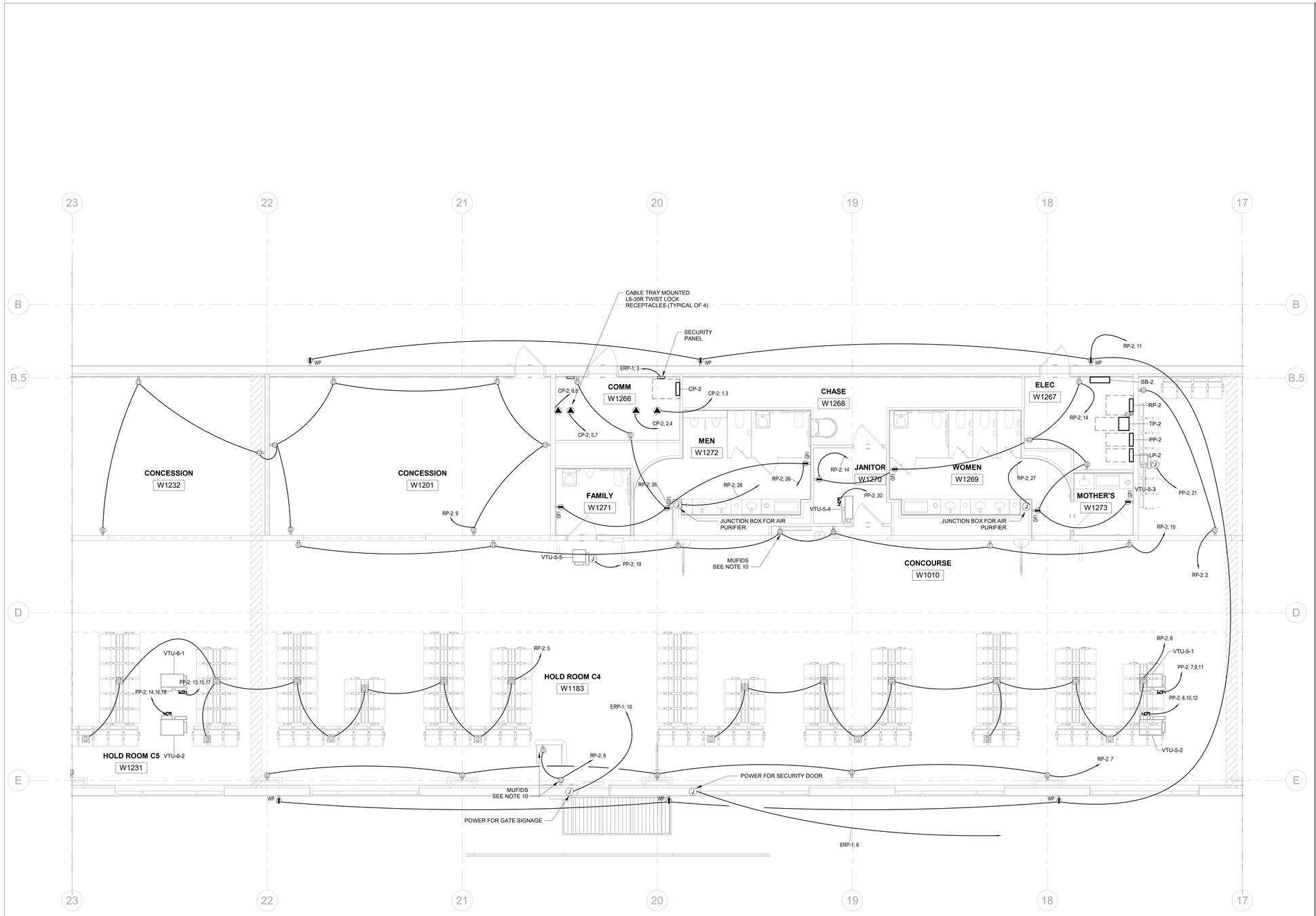

1 LEVEL 1 - POWER - AREA 5
3/16" = 1'-0"

GENERAL ELECTRICAL NOTES:

1. SEE SHEET E000 FOR ELECTRICAL LEGEND, SYMBOLS, GENERAL NOTES & ABBREVIATIONS.
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OKALOOSA COUNTY

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SEAL

Revisions

No.	Date	Description

Project No.:	**Project Number**
Designed By:	**BA**
Drawn By:	
Checked By:	**CMC**
Issue Date:	**30-NOV-2020**
Drawing Scale:	

Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 5

BID DOCUMENT

Drawing No.:

E215

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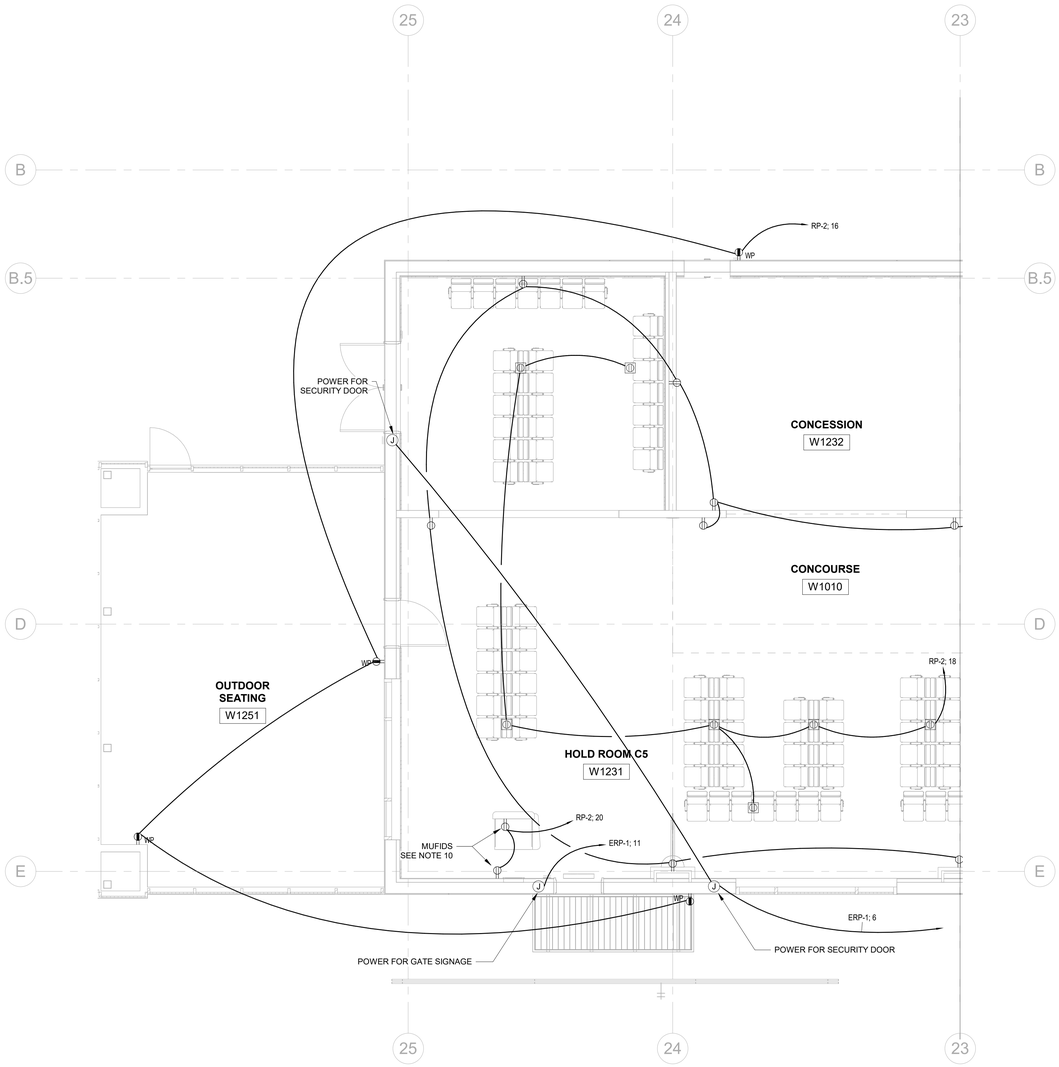

1 LEVEL 1 - POWER - AREA 6
3/16" = 1'-0"

GENERAL ELECTRICAL NOTES:

1. SEE SHEET E000 FOR ELECTRICAL LEGEND, SYMBOLS, GENERAL NOTES & ABBREVIATIONS.
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Design of Satellite Concourse 'C'

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SEAL

Revisions

No.	Date	Description

Project No.:	Project Number
Designed By:	BA
Drawn By:	
Checked By:	CMC
Issue Date:	30-NOV-2020
Drawing Scale:	

Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 6

BID DOCUMENT

Drawing No.:

E216

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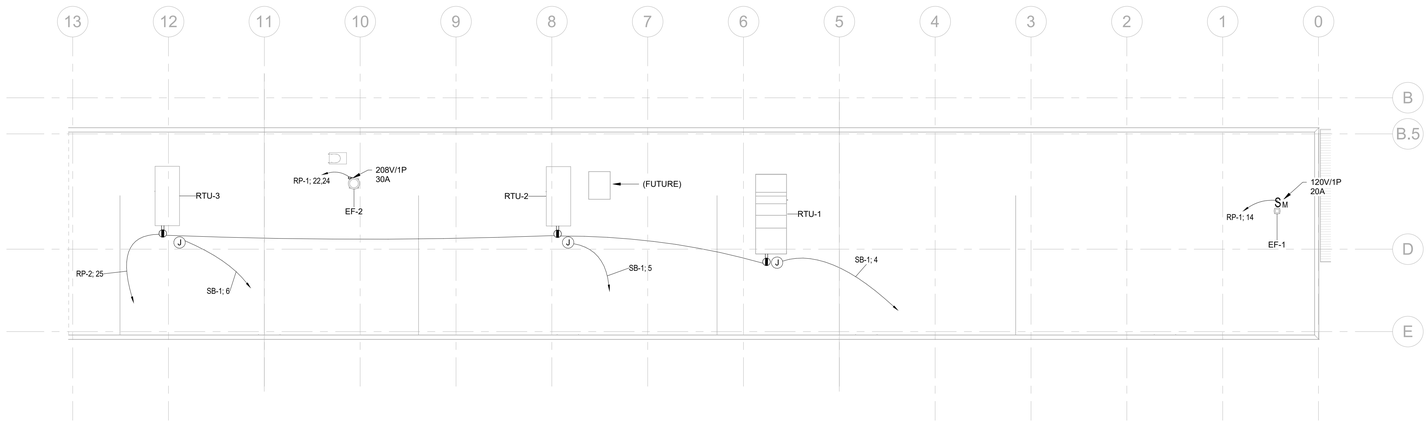
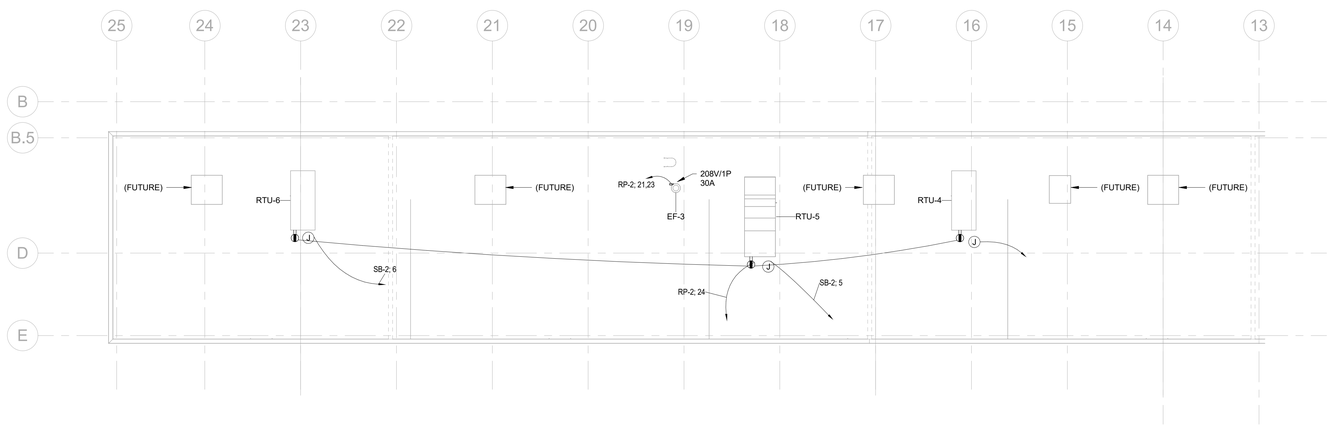


1 ROOF - POWER - BASE BID
1/16" = 1'-0"



2 ROOF - POWER - ALTERNATES
1/16" = 1'-0"

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OKALOOSA COUNTY

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SEAL

Revisions

No.	Date	Description

Project No.:	Project Number
Designed By:	BA
Drawn By:	
Checked By:	CMC
Issue Date:	30-NOV-2020
Drawing Scale:	As indicated

Drawing Title:

ENLARGED FLOOR PLAN ROOF LEVEL

BID DOCUMENT

Drawing No.:

E220

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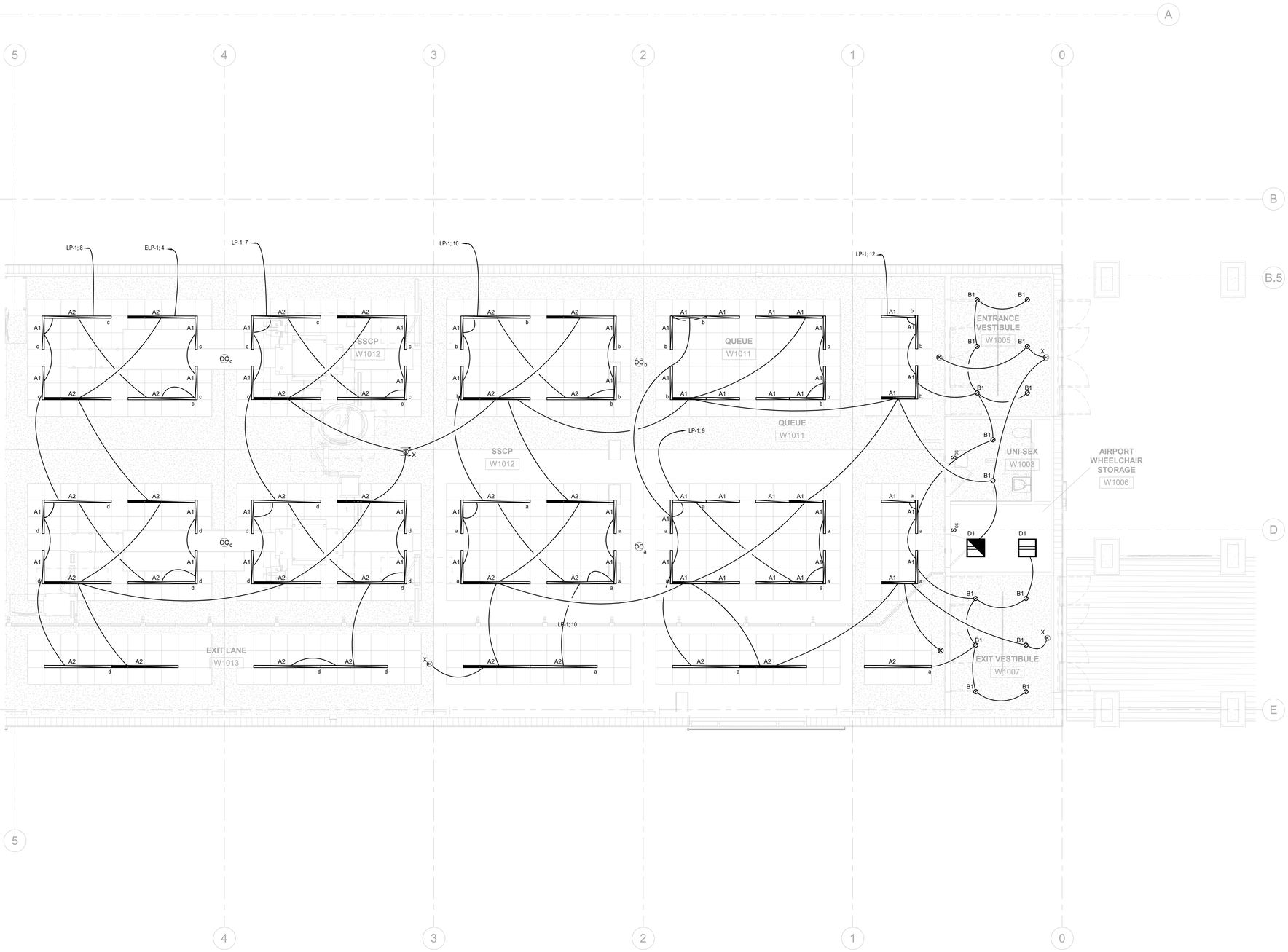

1 LEVEL 1 - LIGHTING - AREA 1
3/16" = 1'-0"

GENERAL ELECTRICAL NOTES:

1. SEE SHEET E000 FOR ELECTRICAL LEGEND, SYMBOLS, GENERAL NOTES & ABBREVIATIONS.
2. SEE SHEETS E601-E603 FOR SWITCHBOARD AND PANEL SCHEDULES.
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Design of Satellite Concourse 'C'

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MLM JOB # TYPE PROPERTY

JOHN E. BURNS
LICENSE
No 62139
STATE OF FLORIDA
PROFESSIONAL ENGINEER

SEAL

Revisions

No.	Date	Description

Project No.:	Project Number
Designed By:	BA
Drawn By:	
Checked By:	CMC
Issue Date:	30-NOV-2020
Drawing Scale:	As indicated

Drawing Title:
ENLARGED FLOOR PLAN LEVEL 1 - AREA 1
BID DOCUMENT

Drawing No.:
E311

BIM 360://Design of Satellite Concourse\VPS_ETSTCFA.rvt
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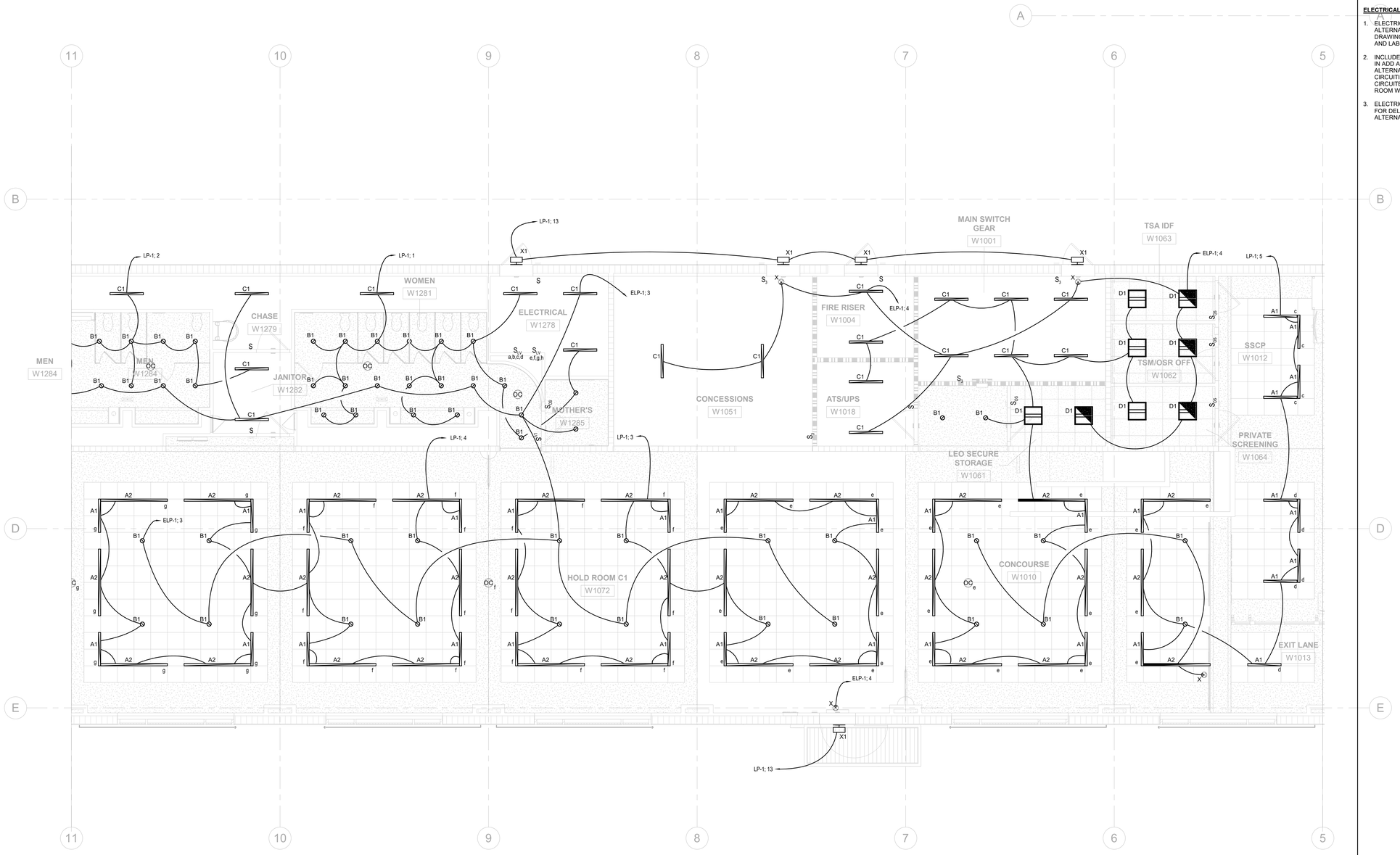

1 LEVEL 1 - LIGHTING - AREA 2
3/16" = 1'-0"

GENERAL ELECTRICAL NOTES:

1. SEE SHEET E000 FOR ELECTRICAL LEGEND, SYMBOLS, GENERAL NOTES & ABBREVIATIONS.
2. SEE SHEETS E601-E603 FOR SWITCHBOARD AND PANEL SCHEDULES.
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Project No.:	Project Number
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Drawn By:	
Checked By:	CMC
Issue Date:	30-NOV-2020
Drawing Scale:	As indicated

Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 2

BID DOCUMENT

Drawing No.:

E312

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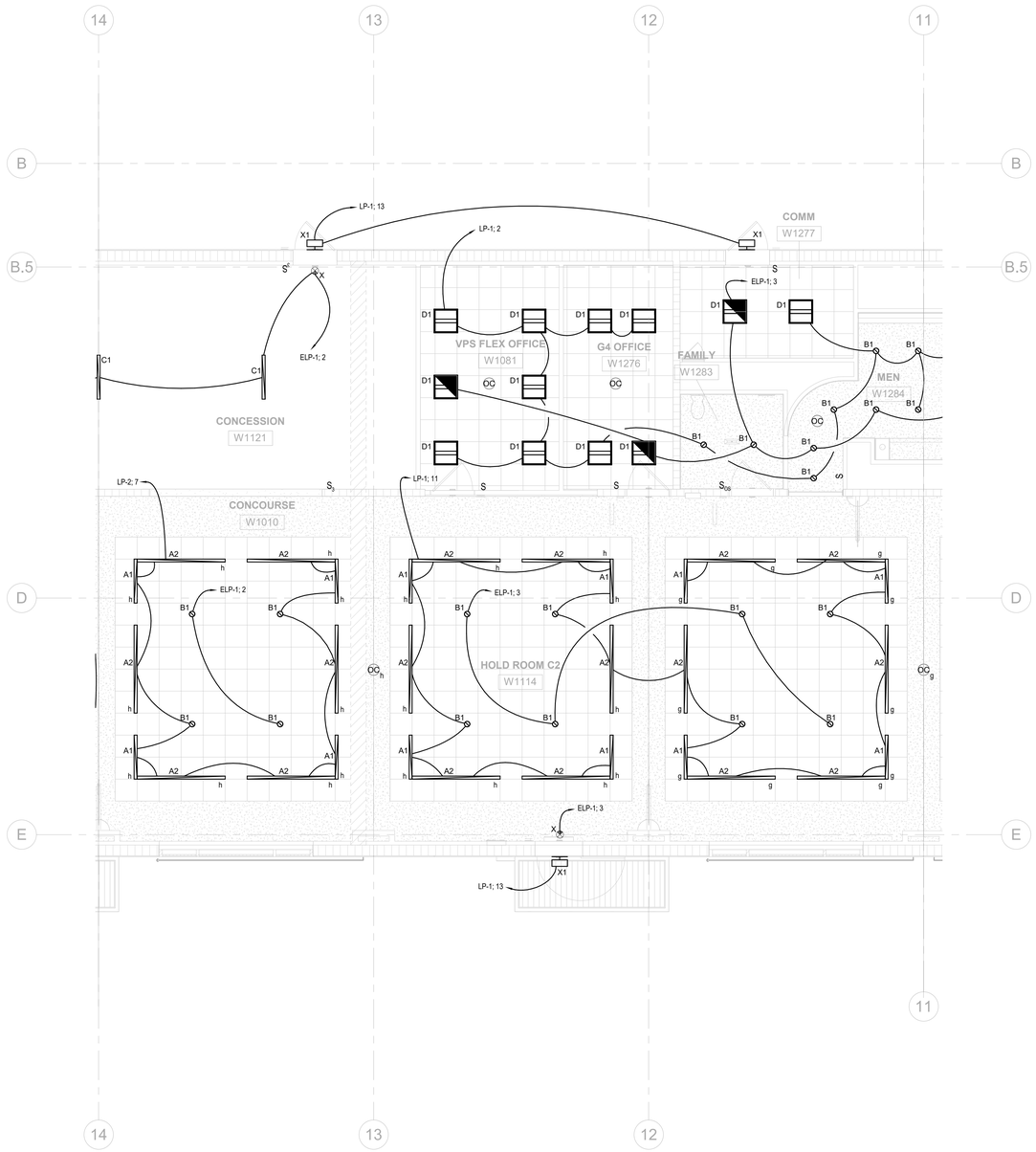

1 LEVEL 1 - LIGHTING - AREA 3
3/16" = 1'-0"

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OKALOOSA COUNTY

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No 62139
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PROFESSIONAL ENGINEER

SEAL

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Drawing Scale:	As indicated

Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 3

BID DOCUMENT

Drawing No.:

E313

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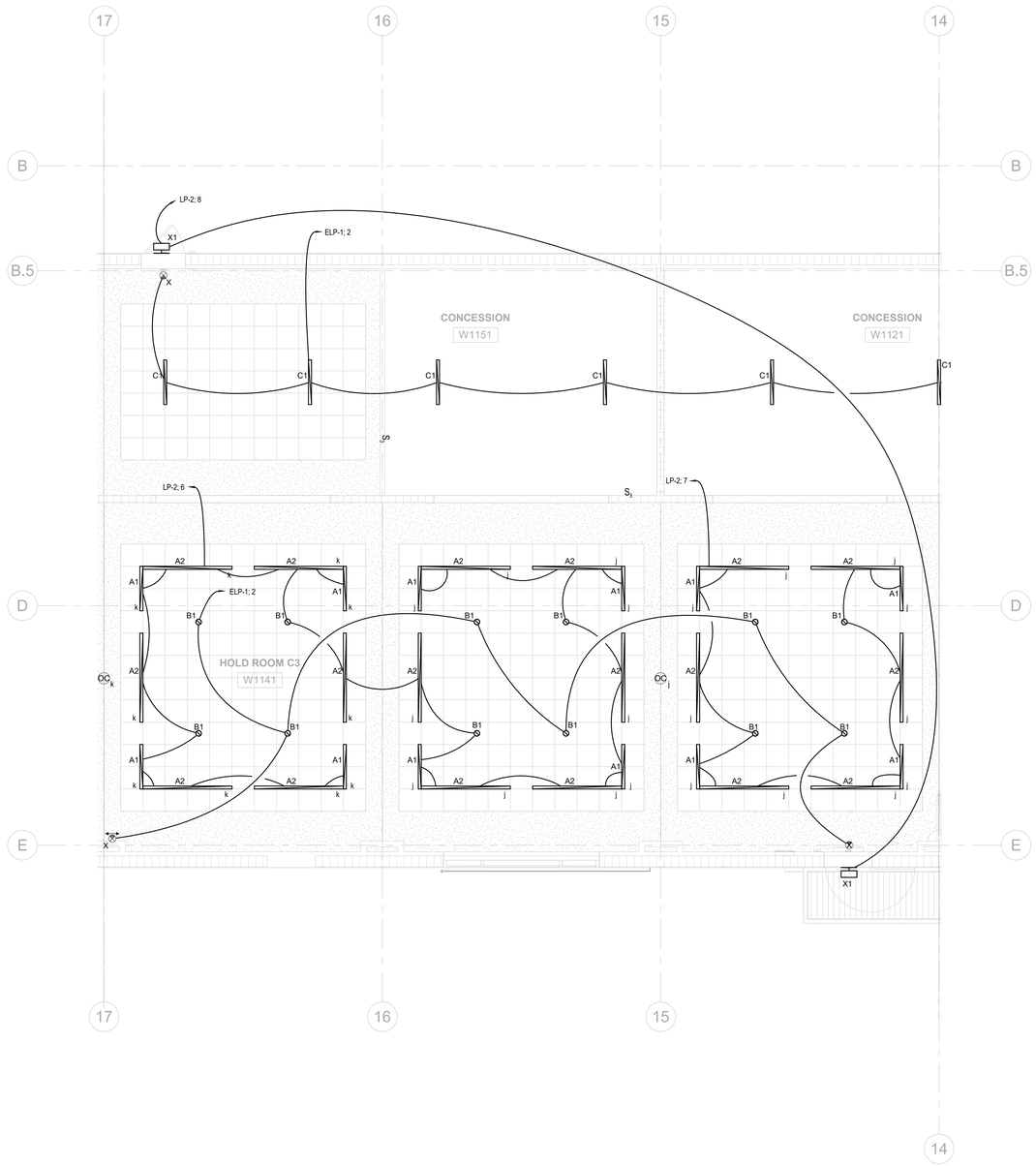

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3. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH ARCHITECT FOR DELINEATION AND DOCUMENTATION TO INCLUDE ADD ALTERNATES.

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MLM JOB # TYPE PROPERTY

JOHN E. BURNS
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STATE OF FLORIDA
PROFESSIONAL ENGINEER
SEAL

Revisions

No.	Date	Description

Project No.:	Project Number
Designed By:	BA
Drawn By:	
Checked By:	CMC
Issue Date:	30-NOV-2020
Drawing Scale:	As indicated

Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 4

BID DOCUMENT

Drawing No.:

E314

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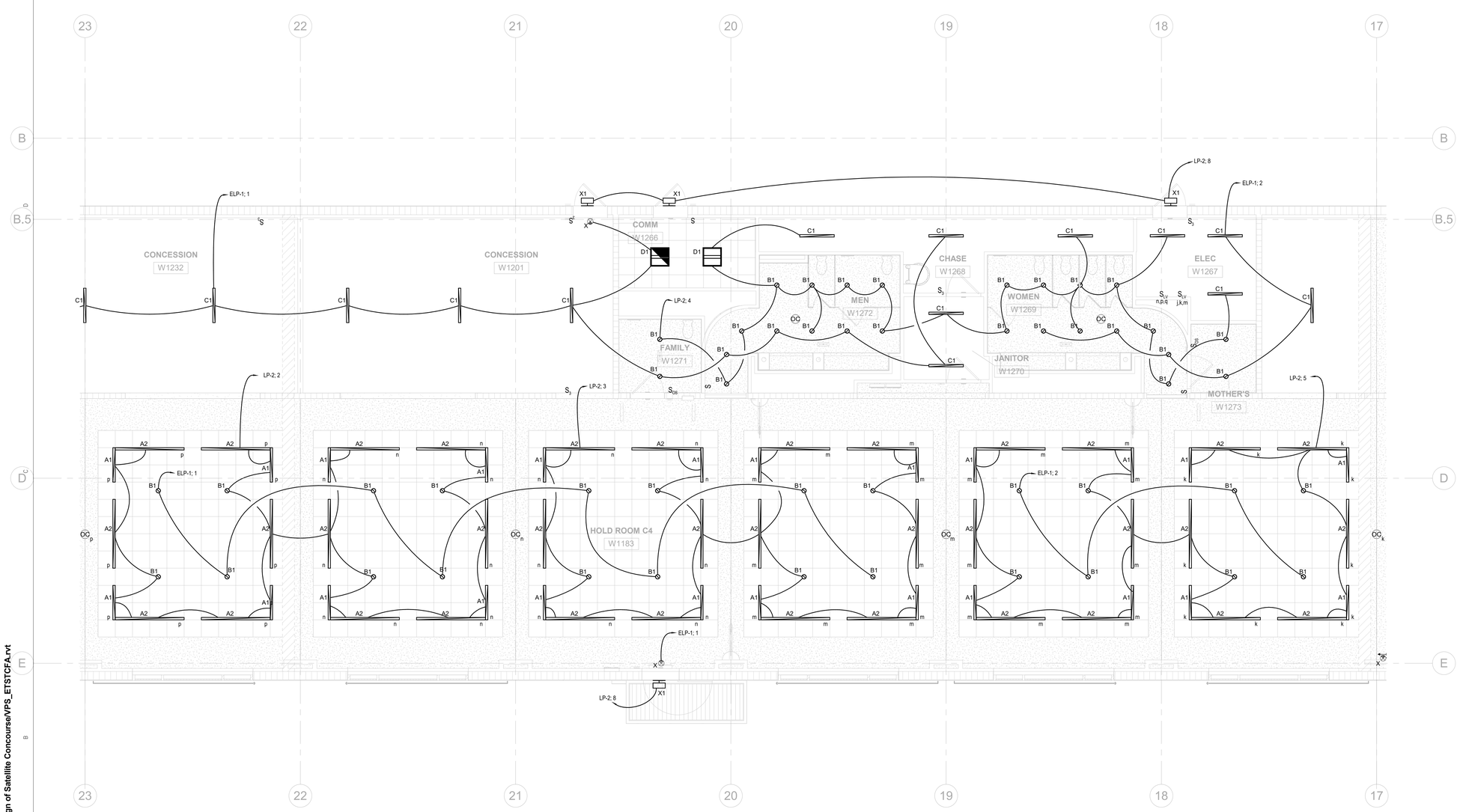

1 LEVEL 1 - LIGHTING - AREA 5
3/16" = 1'-0"

GENERAL ELECTRICAL NOTES:

1. SEE SHEET E000 FOR ELECTRICAL LEGEND, SYMBOLS, GENERAL NOTES & ABBREVIATIONS.
2. SEE SHEETS E601-E603 FOR SWITCHBOARD AND PANEL SCHEDULES.
3. SEE SHEET E604 FOR LIGHTING FIXTURE SCHEDULE.
4. SEE SHEET E801 FOR ELECTRICAL DETAILS.
5. REFER TO MECHANICAL DRAWINGS FOR MORE DETAILS ON HVAC EQUIPMENT.
6. FOR THE ACTUAL SERVICE ENTRANCE RUNS AND LOCATION OF PROPOSED GULF POWER UTILITY TRANSFORMER PAD, REFER TO THE CIVIL DRAWINGS PACKAGE.
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Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 5

BID DOCUMENT

Drawing No.:

E315

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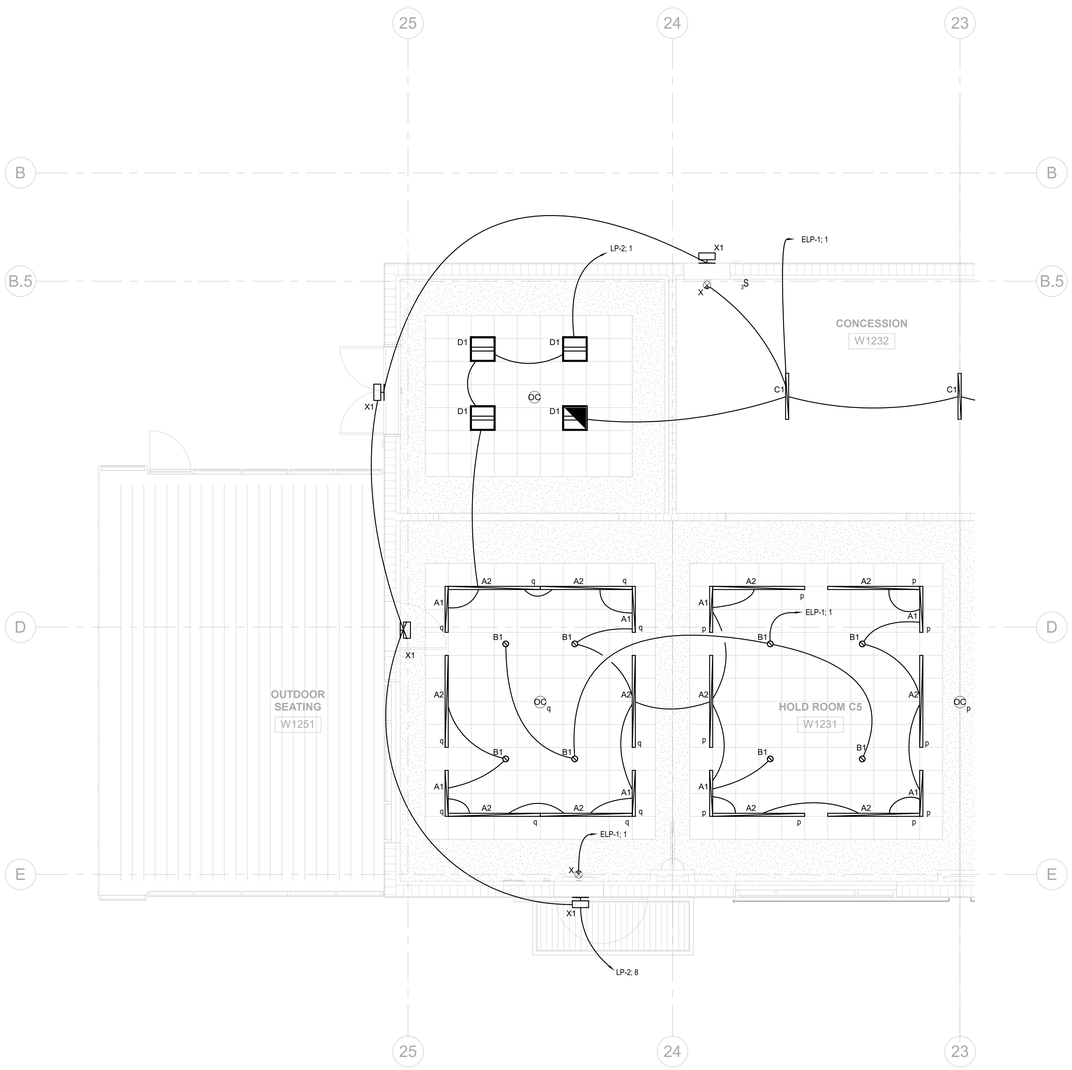

1 LEVEL 1 - LIGHTING - AREA 6
3/16" = 1'-0"

GENERAL ELECTRICAL NOTES:

1. SEE SHEET E000 FOR ELECTRICAL LEGEND, SYMBOLS, GENERAL NOTES & ABBREVIATIONS.
2. SEE SHEETS E601-E603 FOR SWITCHBOARD AND PANEL SCHEDULES.
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Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 6

BID DOCUMENT

Drawing No.:

E316

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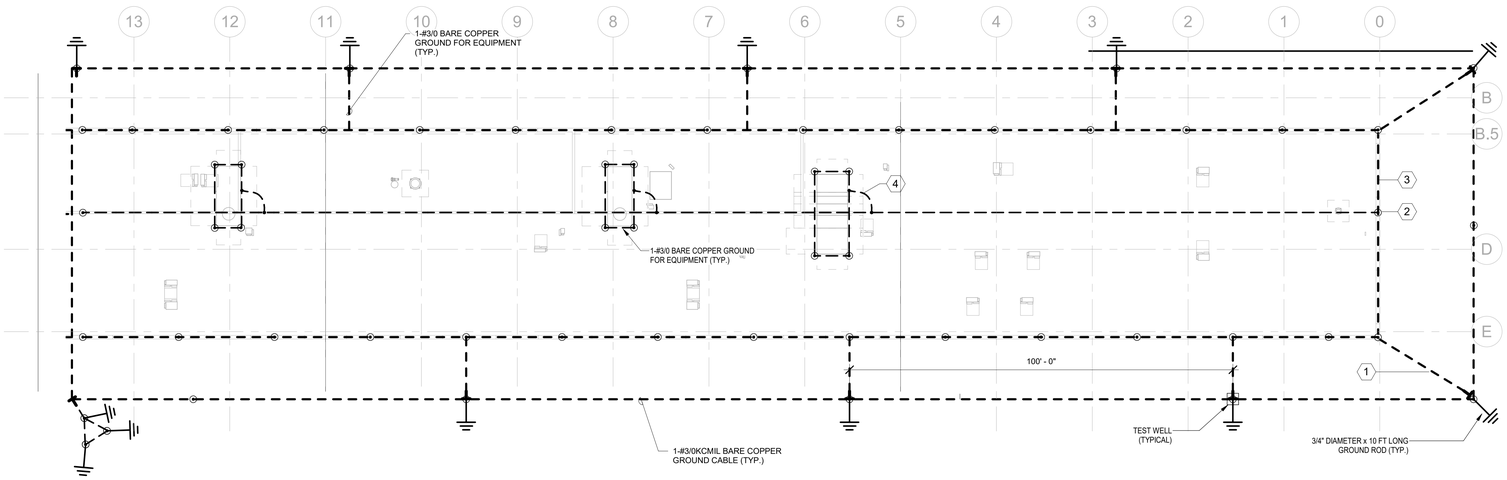
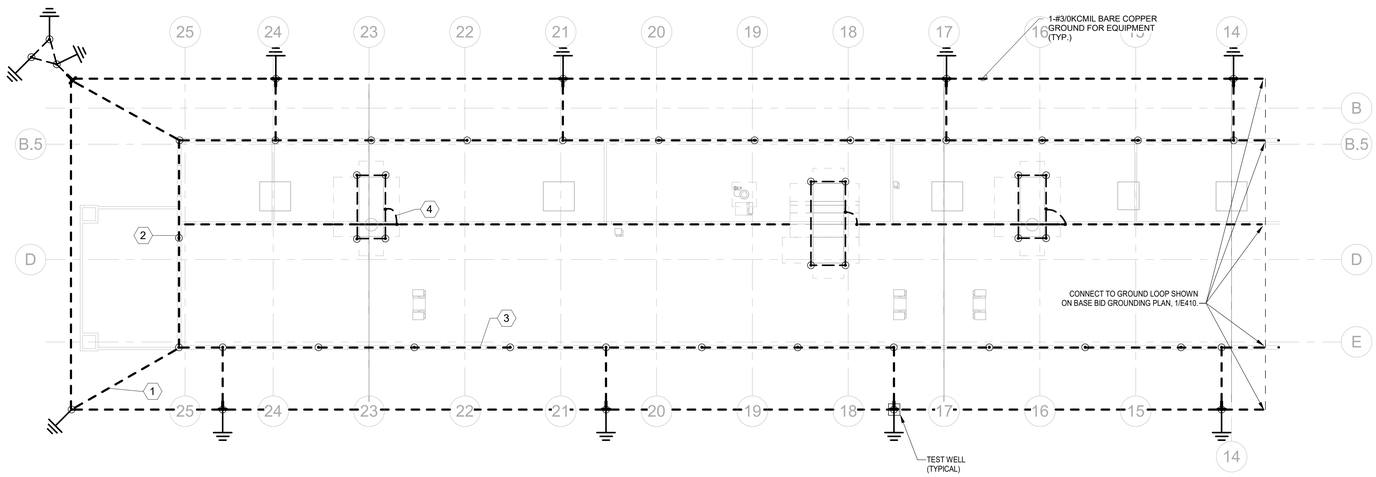


1 LEVEL_1 - GROUNDING_&_LIGHTNING_PROTECTION_-_BASE_BID
1/16" = 1'-0"



2 LEVEL_1 - GROUNDING_&_LIGHTNING_PROTECTION_-_ALTERNATES
1/16" = 1'-0"

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KEYED NOTES

Key Value	Keynote Text
1	PROVIDE CLASS 1 ALUMINUM LIGHTNING PROTECTION CABLE AS DOWN CONDUCTORS EVERY 100' ALONG PERIMETER
2	PROVIDE CROSS CONDUCTOR IN ACCORDANCE WITH NFPA 780, 4.8.3. FOR BLDG WIDTH GREATER THAN 50'. IN ADDITION CLASS 1 CONDUCTOR WILL BE USED TO BOND ROOF TOP MECHANICAL COMPONENTS AND OTHER METAL ITEMS.
3	ALL LIGHTNING PROTECTION ROOF CONDUCTORS SHALL BE CLASS 1 ALUMINUM TO AVOID DISSIMILAR METAL CONTACT
4	PROVIDE CLASS 1 CONNECTION TO MECHANICAL UNITS & AIR TERMINALS LOCATED ON TOP.

EC TO PROVIDE SIGNED/SEALED LIGHTNING PROTECTION SUBMITTAL PREPARED BY INSTALLATION COMPANY WITH LPI AND UL 96/96A CERTIFICATION

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Drawing Title:

LIGHTNING AND GROUNDING PLAN

BID DOCUMENT

Drawing No.:

E410

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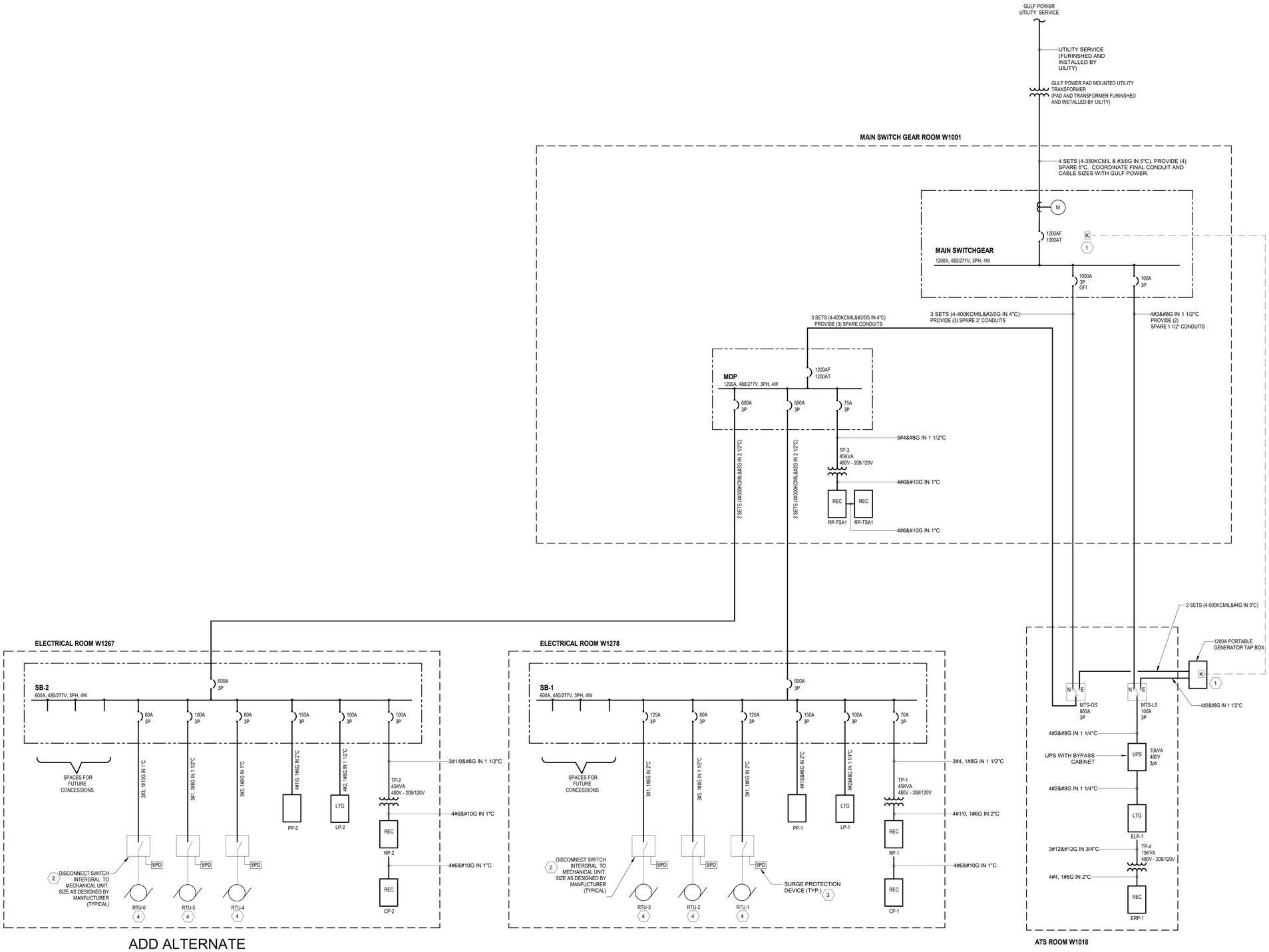

ADD ALTERNATE

1 ELECTRICAL SINGLE LINE DIAGRAM
N.T.S.

GENERAL NOTES - SINGLE LINE DIAGRAM

1. ALL CIRCUIT BREAKERS ARE 3P UON.
2. PROVIDE ARC FLASH LABELS ON ALL ELECTRICAL PANELBOARDS, SWITCHBOARDS, MANUAL TRANSFER SWITCHES, AND DISCONNECT SWITCHES WARNING OF PRESENCE OF ARC FLASH AND NOTING PERSONNEL PROTECTIVE EQUIPMENT (PPE) OR CHARTS IN IEEE 1584 TO DETERMINE THE SAME AS REQUIRED IN NEC 110.16.

KEYED NOTES - SINGLE LINE DIAGRAM

1	PROVIDE KIRK KEY INTELOCK FEATURE WITH CONNECTION TO KIRK KEY AT PORTABLE GENERATOR TAP BOX SO THAT ONLY ONE SOURCE CAN PROVIDE POWER TO THE BUILDING AT A TIME.
2	INTEGRAL DISCONNECT WITH CIRCUIT BREAKER OR FUSING AS REQUIRED BY MANUFACTURER FOR OVERCURRENT OR SHORT CIRCUIT/GROUND FAULT PROTECTION RESPECTIVELY. VFD CONTROL IS PROVIDED BY MANUFACTURER.
3	PROVIDE TYPE 2 SURGE PROTECTIVE DEVICE (SPD) AS INDICATED IN ACCORDANCE WITH FLORIDA BUILDING CODE SECTION 449.3.15.6 SPD TO BE INSTALLED OUTDOORS NEAR EQUIPMENT.
4	THE UNITS ARE SPECIFIED WITH AN INDEPENDENTLY CIRCUITED CONVENIENCE RECEPTACLE WHICH WILL MEET THE NEEDS OF NEC 210.63 (2014ED), FOR SERVICING OF THE UNIT. ADDITIONALLY THE UNITS ARE SPECIFIED WITH AN INDEPENDENTLY WIRED MARINE LIGHT.

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Drawing Scale:	

Drawing Title:

SINGLE LINE DIAGRAM - ELECTRICAL

BID DOCUMENT

Drawing No.:

E501

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Switchboard: MDP

MAIN RATING: 1200 A | **MAIN TYPE:** MCB | **ENCLOSURE:** Type 1 | **MINIMUM AIC RATING:** 65,000
MCB RATING: 1000 A | **WIRES:** 4 | **LOCATION:** SECURE STORAGE W1061 | **NEUTRAL RATING:**
VOLTAGE: 480Y/277V | **MOUNTING:** Surface | **FEED THROUGH LUGS:**
PHASE: 3 | **SUPPLY FROM:** | **GROUNDING BUS:**

NOTE	CKT	DESCRIPTION	WIRE SIZE	COND	P	FRAME	TRIP	LOAD
	1	SB-1	SEE SINGLE LINE DIAGRAM		3	600 A	600 A	344817 VA
	2	SB-2	SEE SINGLE LINE DIAGRAM		3	600 A	600 A	268942 VA
	3	TP-3	SEE SINGLE LINE DIAGRAM		3	100 A	70 A	7980 VA
	4							
	5							
	6							
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							

TOTAL CONNECTED LOAD: 621.74 kVA
TOTAL AMPS: 748 A

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	PANEL TOTALS	
HVAC	2400 VA	100.00%	2400 VA		
Lighting	10515 VA	100.00%	10515 VA	**TOTAL CONNECTED LOAD**	621739 VA
Lighting - Dwelling Unit	980 VA	100.00%	980 VA	**TOTAL ESTIMATED LOAD:**	609496 VA
Lighting - Exterior	1836 VA	125.00%	2295 VA	**TOTAL CONNECTED CURRENT:**	748 A
Power	561222 VA	100.00%	561222 VA	**TOTAL ESTIMATED DEMAND CURRENT**	733 A
Receptacle	34740 VA	64.39%	22370 VA		
RECEPTACLES	10620 VA	97.08%	10310 VA		

Notes:
SEE NOTES BELOW FOR SB-1 AND SB-2. TOTAL CONNECTED LOAD FOR SB-1 IS 418 KVA. TOTAL CONNECTED LOAD FOR SB-2 IS 343 KVA.

Switchboard: SB-1

MAIN RATING: 600 A | **MAIN TYPE:** MCB | **ENCLOSURE:** Type 1 | **MINIMUM AIC RATING:** 65,000 A
MCB RATING: 600 A | **WIRES:** 4 | **LOCATION:** STORAGE W1082 | **NEUTRAL RATING:** 100.00%
VOLTAGE: 480/277 Wye | **MOUNTING:** Surface | **FEED THROUGH LUGS:**
PHASE: 3 | **SUPPLY FROM:** MDP | **GROUNDING BUS:**

NOTE	CKT	DESCRIPTION	WIRE SIZE	COND	P	FRAME	TRIP	LOAD
	1	PANEL PP-1	SEE SINGLE LINE DIAGRAM		3	250 A	150 A	89000 VA
	2	PANEL LP-1	SEE SINGLE LINE DIAGRAM		3	250 A	100 A	7323 VA
	3	PANEL RP-1 VIA TRANSFORMER TP-1	SEE SINGLE LINE DIAGRAM		3	100 A	70 A	26516 VA
	4	RTU-1			3	400 A	20 A	97770 VA
	5	RTU-2			3	400 A	20 A	52840 VA
	6	RTU-3			3	400 A	20 A	71670 VA
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							

TOTAL CONNECTED LOAD: 344.82 kVA
TOTAL AMPS: 415 A

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	PANEL TOTALS	
HVAC	1320 VA	100.00%	1320 VA		
Lighting	5947 VA	100.00%	5947 VA	**TOTAL CONNECTED LOAD**	344817 VA
Lighting - Dwelling Unit	560 VA	100.00%	560 VA	**TOTAL ESTIMATED LOAD:**	341281 VA
Lighting - Exterior	816 VA	125.00%	1020 VA	**TOTAL CONNECTED CURRENT:**	415 A
Power	314696 VA	100.00%	314696 VA	**TOTAL ESTIMATED DEMAND CURRENT**	410 A
Receptacle	17460 VA	78.64%	13730 VA		
RECEPTACLES	4320 VA	100.00%	4320 VA		

Notes:
IN ADDITION TO THE ABOVE LOADS, WE ESTIMATE A TOTAL OF 25 KVA FOR EACH OF THE THREE GRAB AND GO CONCESSION AREAS, BRINGING THE TOTAL CONNECTED LOAD TO 418 KVA.

Switchboard: SB-2

MAIN RATING: 600 A | **MAIN TYPE:** MCB | **ENCLOSURE:** Type 1 | **MINIMUM AIC RATING:** 65,000 A
MCB RATING: 600 A | **WIRES:** 4 | **LOCATION:** JANITOR W1172 | **NEUTRAL RATING:** 100.00%
VOLTAGE: 480/277 Wye | **MOUNTING:** Surface | **FEED THROUGH LUGS:**
PHASE: 3 | **SUPPLY FROM:** MDP | **GROUNDING BUS:**

NOTE	CKT	DESCRIPTION	WIRE SIZE	COND	P	FRAME	TRIP	LOAD
	1	PANEL PP-2	SEE SINGLE LINE DIAGRAM		3	250 A	150 A	67580 VA
	2	PANEL LP-2	SEE SINGLE LINE DIAGRAM		3	250 A	100 A	6008 VA
	3	PANEL RP-2 VIA TP-2	SEE SINGLE LINE DIAGRAM		3	250 A	100 A	24606 VA
	4	RTU-4			3	400 A	20 A	49220 VA
	5	RTU-5			3	400 A	20 A	72580 VA
	6	RTU-6			3	400 A	20 A	49220 VA
	7							
	8							
	9							
	10							
	11							
	12							
	13							
	14							
	15							
	16							
	17							
	18							
	19							
	20							

TOTAL CONNECTED LOAD: 268.94 kVA
TOTAL AMPS: 323 A

LOAD CLASSIFICATION	CONNECTED LOAD	DEMAND FACTOR	ESTIMATED DEMAND	PANEL TOTALS	
HVAC	1080 VA	100.00%	1080 VA		
Lighting	4568 VA	100.00%	4568 VA	**TOTAL CONNECTED LOAD**	268942 VA
Lighting - Dwelling Unit	420 VA	100.00%	420 VA	**TOTAL ESTIMATED LOAD:**	266715 VA
Lighting - Exterior	1020 VA	125.00%	1275 VA	**TOTAL CONNECTED CURRENT:**	323 A
Power	240886 VA	100.00%	240886 VA	**TOTAL ESTIMATED DEMAND CURRENT**	321 A
Receptacle	14940 VA	83.47%	12470 VA		
RECEPTACLES	6300 VA	100.00%	6300 VA		

Notes:
IN ADDITION TO THE ABOVE LOADS, WE ESTIMATE A TOTAL OF 25 KVA FOR EACH OF THE THREE GRAB AND GO CONCESSION AREAS, BRINGING THE TOTAL CONNECTED LOAD TO 343 KVA.

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SWITCHBOARD SCHEDULES

BID DOCUMENT

Drawing No.:

E601

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BRANCH PANEL: RP-TSA1

Location: SECURE STORAGE W1061
Supply From: TP-3
Mounting: Surface
Enclosure: Type 1
Volts: 120/208 Wye
Phases: 3
Wires: 4
A.I.C. Rating:
Mains Type: MCB
Mains Rating: 100 A
MCB Rating: 175 A

CKT	Circuit Description	Trip	Poles	Wire Size	A		B		C		Wire Size	Poles	Trip	Circuit Description	CKT
1	TSA PODIUM POWER POLES	20 A	1	2#12&#12G IN 3/4"C	360 VA	180 VA					2#12&#12G IN 3/4"C	1	20 A	AIT SCANNER	2
3	TSA PODIUM POWER POLES	20 A	1	2#12&#12G IN 3/4"C			360 VA	1920 VA			2#12&#12G IN 3/4"C	1	20 A	XRAY	4
5	XRAY	20 A	1	2#12&#12G IN 3/4"C					1920 VA	900 VA	2#12&#12G IN 3/4"C	1	20 A	TSA EQUIPMENT	6
7	TSA EQUIPMENT	20 A	1	2#12&#12G IN 3/4"C	900 VA	180 VA					2#12&#12G IN 3/4"C	1	20 A	PRIVATE SCREENING...	8
9	TSA EQUIPMENT	20 A	1	2#12&#12G IN 3/4"C			180 VA	360 VA			2#12&#12G IN 3/4"C	1	20 A	MEDIA EQUIPMENT	10
11	RP-TSA2	20 A	3	SEE SINGLE LINE...					0 VA	360 VA	2#12&#12G IN 3/4"C	1	20 A	TSA OBSERVATION WORK...	12
13	--	--	--	--	0 VA	360 VA					2#12 & 1#12G, 3/4"C.	1	20 A	WTMD	14
15	--	--	--	--			0 VA								16
17															18
19															20
21															22
23															24
25															26
27															28
29															30
31															32
33															34
35															36
37															38
39															40
41															42
				Total Load:	1980 VA		2820 VA		3180 VA						
				Total Amps:	17 A		25 A		28 A						

Panel Totals:
Total Conn. Load: 7980 VA
Total Est. Demand: 7980 VA
Total Conn. Current: 22 A
Total Est. Demand Current:... 22 A

Legend:

Notes:
PROVIDE WITH FEED THROUGH LUGS

BRANCH PANEL: RP-TSA2

Location: SECURE STORAGE W1061
Supply From: RP-TSA1
Mounting: Surface
Enclosure: Type 1
Volts: 120/208 Wye
Phases: 3
Wires: 4
A.I.C. Rating:
Mains Type: MCB
Mains Rating: 100 A
MCB Rating: 175 A

CKT	Circuit Description	Trip	Poles	Wire Size	A		B		C		Wire Size	Poles	Trip	Circuit Description	CKT
1															2
3															4
5															6
7															8
9															10
11															12
13															14
15															16
17															18
19															20
21															22
23															24
25															26
27															28
29															30
31															32
33															34
35															36
37															38
39															40
41															42
				Total Load:	0 VA		0 VA		0 VA						
				Total Amps:	0 A		0 A		0 A						

Panel Totals:
Total Conn. Load: 0 VA
Total Est. Demand: 0 VA
Total Conn. Current: 0 A
Total Est. Demand Current:... 0 A

Legend:

Notes:

BRANCH PANEL: ELP-1

Location: ATS/UPS W1018
Supply From:
Mounting: Surface
Enclosure: Type 1
Volts: 480/277 Wye
Phases: 3
Wires: 4
A.I.C. Rating:
Mains Type: MCB
Mains Rating: 125 A
MCB Rating: 100 A

CKT	Circuit Description	Trip	Poles	Wire Size	A		B		C		Wire Size	Poles	Trip	Circuit Description	CKT
1	EMERGENCY LIGHTING	20 A	1	2#12 & 1#12G, 3/4"C.	487 VA	478 VA					2#12 & 1#12G, 3/4"C.	1	20 A	EMERGENCY LIGHTING	2
3	EMERGENCY LIGHTING	20 A	1	2#12 & 1#12G, 3/4"C.			370 VA	1205 VA			2#12 & 1#12G, 3/4"C.	1	20 A	EMERGENCY LIGHTING	4
5	TP-4	20 A	3	SEE SINGLE LINE...					1800 VA						6
7	--	--	--	--	1760 VA										8
9	--	--	--	--			3500 VA								10
11															12
13															14
15															16
17															18
19															20
21															22
23															24
25															26
27															28
29															30
31															32
33															34
35															36
37															38
39															40
41															42
				Total Load:	2722 VA		5051 VA		1800 VA						
				Total Amps:	10 A		19 A		6 A						

Panel Totals:
Total Conn. Load: 9571 VA
Total Est. Demand: 9571 VA
Total Conn. Current: 12 A
Total Est. Demand Current:... 12 A

Legend:

Notes:

BRANCH PANEL: ERP-1

Location: ATS/UPS W1018
Supply From: TP-4
Mounting: Surface
Enclosure: Type 1
Volts: 120/208 Wye
Phases: 3
Wires: 4
A.I.C. Rating:
Mains Type: MCB
Mains Rating: 100 A
MCB Rating: 60 A

CKT	Circuit Description	Trip	Poles	Wire Size	A		B		C		Wire Size	Poles	Trip	Circuit Description	CKT
1	FACP, W1004	20 A	1	2#12 & 1#12G, 3/4"C.	400 VA	400 VA					2#12 & 1#12G, 3/4"C.	1	20 A	SECURITY PANEL, W1277	2
3	SECURITY PANEL, W1266	20 A	1	2#12 & 1#12G, 3/4"C.			400 VA	360 VA				1	20 A	Receptacle	4
5	Power	20 A	1						1500 VA	1500 VA		1	20 A	Power	6
7	Power	20 A	1		500 VA	500 VA						1	20 A	Power	8
9	Power	20 A	1				500 VA	500 VA				1	20 A	Power	10
11	Power	20 A	1						500 VA						12
13															14
15															16
17															18
19															20
21															22
23															24
25															26
27															28
29															30
31															32
33															34
35															36
37															38
39															40
41															42
				Total Load:	1800 VA		1760 VA		3500 VA						
				Total Amps:	15 A		15 A		29 A						

Panel Totals:
Total Conn. Load: 7060 VA
Total Est. Demand: 7060 VA
Total Conn. Current: 20 A
Total Est. Demand Current:... 20 A

Legend:

Notes:

BRANCH PANEL: CP-1

Location: G4 OFFICE W1113
Supply From:
Mounting: Surface
Enclosure: Type 1
Volts: 120/208 Wye
Phases: 3
Wires: 4
A.I.C. Rating:
Mains Type: MCB
Mains Rating: 100 A
MCB Rating: 60 A

CKT	Circuit Description	Trip	Poles	Wire Size	A		B		C		Wire Size	Poles	Trip	Circuit Description	CKT
1	COMMUNICATIONS CABINET	30 A	2	2#10&#10G IN 3/4"C	1500 VA	1500 VA					2#10&#10G IN 3/4"C	2	30 A	COMMUNICATIONS CABINET	2
3	--	--	--	--			1500 VA	1500 VA			--	--	--	--	4
5	COMMUNICATIONS CABINET	30 A	2	2#10&#10G IN 3/4"C					1500 VA	1500 VA	2#10&#10G IN 3/4"C	2	30 A	COMMUNICATIONS CABINET	6
7	--	--	--	--	1500 VA	1500 VA					--	--	--	--	8
9	RECEPTACLES, W1277	20 A	1	2#12 & 1#12G, 3/4"C.			540 VA	180 VA				2	20 A	Power	10
11	Receptacle	20 A	1						180 VA	180 VA	--	--	--	--	12
				Total Load:	6000 VA		3720 VA		3360 VA						
				Total Amps:	50 A		31 A		28 A						

Panel Totals:
Total Conn. Load: 13080 VA
Total Est. Demand: 13080 VA
Total Conn. Current: 36 A
Total Est. Demand Current:... 36 A

Legend:

Notes:

BRANCH PANEL: CP-2

Location: COMM W1266
Supply From: RP-2
Mounting: Surface
Enclosure: Type 1
Volts: 120/208 Wye
Phases: 3
Wires: 4
A.I.C. Rating:
Mains Type: MCB
Mains Rating: 100 A
MCB Rating: 60 A

CKT	Circuit Description	Trip	Poles	Wire Size	A		B		C		Wire Size	Poles	Trip	Circuit Description	CKT
1	COMMUNICATIONS CABINET	30 A	2	2#10&#10G IN 3/4"C	180 VA	180 VA					2#10&#10G IN 3/4"C	2	30 A	COMMUNICATIONS CABINET	2
3	--	--	--	--			180 VA	180 VA			--	--	--	--	4
5	COMMUNICATIONS CABINET	30 A	2	2#10&#10G IN 3/4"C					180 VA	180 VA	2#10&#10G IN 3/4"C	2	30 A	COMMUNICATIONS CABINET	6
7	--	--	--	--	180 VA	180 VA					--	--	--	--	8
9															10
11															12
				Total Load:	720 VA		360 VA		360 VA						
				Total Amps:	6 A		3 A		3 A						

Panel Totals:
Total Conn. Load: 1440 VA
Total Est. Demand: 1440 VA
Total Conn. Current: 4 A
Total Est. Demand Current:... 4 A

Legend:

Notes:

OKALOOSA COUNTY

FLY VPS

C19-2811-AP
Design of
Satellite
Concourse 'C'

Burns
BURNS ENGINEERING, INC | 215 979-3700
TWO COMMERCE SQUARE,
2001 MARKET ST, SUITE 600
PHILADELPHIA, PA 19103

MLM-MARTIN ARCHITECTS, INC.
668 N. ORLANDO AVE.
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MLM JOB # TYPE PROPERTY

JOHN E. BURNS
LICENSE
No 62139
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

SEAL

Revisions

No.	Date	Description

Project No.:	**Project Number**
Designed By:	**BA**
Drawn By:	
Checked By:	**CMC**
Issue Date:	**30-NOV-2020**
Drawing Scale:	

Drawing Title:

PANEL SCHEDULES

BID DOCUMENT

Drawing No.:

E602

BIM 360://Design of Satellite Concourse\VPS_ETSTCFA.rvt
12/3/2020 1:52:29 PM

BRANCH PANEL: PP-1

Location: STORAGE W1082
Supply From: SB-1
Mounting: Surface
Enclosure: Type 1

Volts: 480/277 Wye
Phases: 3
Wires: 4

A.I.C. Rating:
Mains Type: MCB
Mains Rating: 150 A
MCB Rating: 150 A

CKT	Circuit Description	Trip	Poles	Wire Size	A		B		C		Wire Size	Poles	Trip	Circuit Description	CKT
1	VTU-1-1	20 A	3	3#10&#10G IN 3/4"C	4000 VA	2667 VA					3#10&#10G IN 3/4"C	3	15 A	VTU-1-2	2
3	--	--	--	--			4000 VA	2667 VA			--	--	--	--	4
5	--	--	--	--					4000 VA	2667 VA	--	--	--	--	6
7	VTU-1-3	20 A	3	3#12&#12G IN 3/4"C	3167 VA	1500 VA					3#12&#12G IN 3/4"C	3	15 A	VTU-1-4	8
9	--	--	--	--			3167 VA	1500 VA			--	--	--	--	10
11	--	--	--	--					3167 VA	1500 VA	--	--	--	--	12
13	VTU-1-5	20 A	1	2#12 & 1#12G, 3/4"C.	3500 VA	3000 VA					3#12&#12G IN 3/4"C	3	20 A	VTU-1-6 & 1-7	14
15	VTU-2-2	20 A	1	2#12 & 1#12G, 3/4"C.			4000 VA	3000 VA			--	--	--	--	16
17	VTU-3-1	20 A	1	2#12 & 1#12G, 3/4"C.					4000 VA	3000 VA	--	--	--	--	18
19	VTU-1-8	20 A	1	2#12&#12G IN 3/4"C	1000 VA										20
21	VTU-2-3	20 A	3	3#10&#10G IN 3/4"C			3833 VA								22
23	--	--	--	--					3833 VA						24
25	--	--	--	--	3833 VA	2500 VA					2#12&#12G IN 3/4"C	1	15 A	VTU-2-6	26
27								3833 VA			3#10&#10G IN 3/4"C	3	20 A	VTU 3-2	28
29										3833 VA	--	--	--	--	30
31						3833 VA					--	--	--	--	32
33	CTRLS VTU 1-9,2-1,2-4,2-5,3-5	20 A	1	2#12&#12G IN 3/4"C			2700 VA	1000 VA			2#12&#12G IN 3/4"C	1	20 A	VTU-3-4	34
35	VTU-3-5	20 A	1	2#12&#12G IN 3/4"C					1000 VA	3300 VA	2#12 & 1#12G, 3/4"C.	1	20 A	UH-1	36
37															38
39															40
41															42
				Total Load:	29000 VA		29700 VA		30300 VA						
				Total Amps:	105 A		108 A		110 A						

Panel Totals:
Total Conn. Load: 89000 VA
Total Est. Demand: 89000 VA
Total Conn. Current: 107 A
Total Est. Demand Current:... 107 A

Legend:

Notes:

BRANCH PANEL: PP-2

Location: JANITOR W1172
Supply From: SB-2
Mounting: Surface
Enclosure: Type 1

Volts: 480/277 Wye
Phases: 3
Wires: 4

A.I.C. Rating:
Mains Type: MCB
Mains Rating: 150 A
MCB Rating: 150 A

CKT	Circuit Description	Trip	Poles	Wire Size	A		B		C		Wire Size	Poles	Trip	Circuit Description	CKT
1	VTU 4-1	15 A	3	2#12&#12G IN 3/4"C	1833 VA	5167 VA					3#10&#10G IN 3/4"C	3	25 A	VTU 4-2	2
3	--	--	--	--			1833 VA	5167 VA			--	--	--	--	4
5	--	--	--	--					1833 VA	5167 VA	--	--	--	--	6
7	VTU-5-1	15 A	3	3#12&#12G IN 3/4"C	2333 VA	6333 VA					3#10&#10G IN 3/4"C	3	30 A	VTU-5-2	8
9	--	--	--	--			2333 VA	6333 VA			--	--	--	--	10
11	--	--	--	--					2333 VA	6333 VA	--	--	--	--	12
13	VTU-6-1	15 A	3	3#12&#12G IN 3/4"C	2000 VA	3833 VA					3#10&#10G IN 3/4"C	3	20 A	VTU-6-2	14
15	--	--	--	--			2000 VA	3833 VA			--	--	--	--	16
17	--	--	--	--					2000 VA	3833 VA	--	--	--	--	18
19	VTU-5-5	20 A	1	2#12 & 1#12G, 3/4"C.	540 VA	2000 VA					2#12 & 1#12G, 3/4"C.	1	20 A	VTU-5-4	20
21	VTU-5-3	20 A	1	2#12&#12G IN 3/4"C			540 VA								22
23															24
25															26
27															28
29															30
31															32
33															34
35															36
37															38
39															40
41															42
				Total Load:	24040 VA		22040 VA		21500 VA						
				Total Amps:	87 A		80 A		78 A						

Panel Totals:
Total Conn. Load: 67580 VA
Total Est. Demand: 67580 VA
Total Conn. Current: 81 A
Total Est. Demand Current:... 81 A

Legend:

Notes:

BRANCH PANEL: RP-1

Location: STORAGE W1082
Supply From: TP-1
Mounting: Surface
Enclosure: Type 1

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating:
Mains Type: MCB
Mains Rating: 150 A
MCB Rating: 150 A

CKT	Circuit Description	Trip	Poles	Wire Size	A		B		C		Wire Size	Poles	Trip	Circuit Description	CKT
1	GFI RECEPTACLE, W1003	20 A	1	2#12 & 1#12G, 3/4"C.	180 VA	1080 VA					2#12 & 1#12G, 3/4"C.	1	20 A	TSA RECEPTACLES	2
3	TSA RECEPTACLES	20 A	1	2#12 & 1#12G, 3/4"C.			1080 VA	1080 VA			2#12 & 1#12G, 3/4"C.	1	20 A	TSA RECEPTACLES	4
5	EXTERIOR RECEPTACLES	20 A	1	2#12 & 1#12G, 3/4"C.					540 VA	540 VA	2#12 & 1#12G, 3/4"C.	1	20 A	EXTERIOR RECEPTACLES	6
7	HOLD RM FURNITURE USB...	20 A	1	2#12 & 1#12G, 3/4"C.	1620 VA	1260 VA					2#12 & 1#12G, 3/4"C.	1	20 A	RECEPTACLES, W1010	8
9	HOLD RM FURNITURE USB...	20 A	1	2#12&#12G IN 3/4"C			1440 VA	1260 VA			2#12&#12G IN 3/4"C	1	20 A	HOLD RM FURNITURE USB...	10
11	HOLD ROOM RECEPTACLES	20 A	1	2#12&#12G IN 3/4"C					720 VA	720 VA	--	1	20 A	Receptacle	12
13	TOILET RM & JANITOR...	20 A	1	2#12&#12G IN 3/4"C	1440 VA	240 VA					2#12 & 1#12G, 3/4"C.	1	20 A	EF-1	14
15	ULITITY ROOMS...	20 A	1	2#12&#12G IN 3/4"C			1440 VA	1440 VA			2#12 & 1#12G, 3/4"C.	1	20 A	RECEPTACLES,...	16
17	HOLD ROOM RECEPTACLES	20 A	1	2#12&#12G IN 3/4"C					900 VA	900 VA	2#12 & 1#12G, 3/4"C.	1	20 A	OFFICE RECEPTACLES...	18
19	HOLD RM PODIUM...	20 A	1	2#12&#12G IN 3/4"C	360 VA	720 VA					2#12&#12G IN 3/4"C	1	20 A	EXTERIOR RECEPTACLES	20
21	EXTERIOR RECEPTACLES	20 A	1	2#12&#12G IN 3/4"C			720 VA	1248 VA			2#10&#10G IN 3/4"C	2	25 A	EF-2	22
23	OFFICE RECEPTACLES...	20 A	1	2#12 & 1#12G, 3/4"C.					900 VA	1248 VA	--	--	--	--	24
25	HOLD RM PODIUM...	20 A	1	2#12 & 1#12G, 3/4"C.	360 VA	540 VA					2#12 & 1#12G, 3/4"	1	20 A	Receptacle	26
27	Receptacle	20 A	1	2#12 & 1#12G, 3/4"			360 VA	1000 VA			2#12&#12G IN 3/4"C	1	20 A	EWC-1	28
29	Power	20 A	1						500 VA	500 VA		1	20 A	Power	30
31	RECEPTACLE,EXTERIOR	20 A	1	2#12 & 1#12G, 3/4"	180 VA										32
33															34
35															36
37															38
39															40
41															42
				Total Load:	7980 VA		11068 VA		7468 VA						
				Total Amps:	67 A		93 A		62 A						

Panel Totals:
Total Conn. Load: 26516 VA
Total Est. Demand: 22786 VA
Total Conn. Current: 74 A
Total Est. Demand Current:... 63 A

Legend:

Notes:

BRANCH PANEL: RP-2

Location: JANITOR W1172
Supply From: TP-2
Mounting: Surface
Enclosure: Type 1

Volts: 120/208 Wye
Phases: 3
Wires: 4

A.I.C. Rating:
Mains Type: MCB
Mains Rating: 150 A
MCB Rating: 150 A

CKT	Circuit Description	Trip	Poles	Wire Size	A		B		C		Wire Size	Poles	Trip	Circuit Description	CKT
1	HOLD RM FURNITURE USB...	20 A	1	2#12 & 1#12G, 3/4"C.	1440 VA	1620 VA					2#12 & 1#12G, 3/4"C.	1	20 A	CONCESSION RM...	2
3	HOLD ROOM RECEPTACLES	20 A	1	2#12 & 1#12G, 3/4"C.			1260 VA	360 VA			2#12 & 1#12G, 3/4"C.	1	20 A	HOLD RM PODIUM...	4
5	HOLD RM FURNITURE USB...	20 A	1	2#12 & 1#12G, 3/4"C.					1800 VA	360 VA	2#12 & 1#12G, 3/4"C.	1	20 A	HOLD RM PODIUM...	6
7	HOLD ROOM RECEPTACLES	20 A	1	2#12 & 1#12G, 3/4"C.	900 VA	1800 VA					2#12 & 1#12G, 3/4"C.	1	20 A	HOLD RM FURNITURE USB...	8
9	CONCESSION RM...	20 A	1	2#12 & 1#12G, 3/4"C.			1620 VA	1260 VA			2#12 & 1#12G, 3/4"C.	1	20 A	HOLD ROOM RECEPTACLES	10
11	EXTERIOR RECEPTACLES	20 A	1	2#12&#12G IN 3/4"C					1080 VA	180 VA	2#12 & 1#12G, 3/4"C.	1	20 A	HOLD RM PODIUM...	12
13	CP-2	60 A	3	SEE SINGLE LINE...	720 VA	1260 VA					2#12 & 1#12G, 3/4"C.	1	20 A	TOILET RM RECEPT	14
15	--	--	--	--			360 VA	720 VA			2#12 & 1#12G, 3/4"C.	1	20 A	EXTERIOR RECEPTACLES	16
17	--	--	--	--					360 VA	1260 VA	2#12 & 1#12G, 3/4"C.	1	20 A	HOLD RM FURNITURE USB...	18
19	VTU-5-5	20 A	1	2#12 & 1#12G, 3/4"C.	1620 VA	360 VA					2#12 & 1#12G, 3/4"C.	1	20 A	HOLD RM PODIUM...	20
21	EF-3	15 A	2	2#12 & 1#12G, 3/4"C.			463 VA	360 VA			2#12 & 1#12G, 3/4"C.	1	20 A	EXTERIOR RECEPTACLES	22
23	--	--	--	--					463 VA	540 VA		1	20 A	Receptacle	24
25	Receptacle	20 A	1		540 VA	900 VA						1	20 A	Receptacle	26
27	Power	20 A	1				500 VA	500 VA				1	20 A	Power	28
29															30
31															32
33															34
35															36
37															38
39															40
41															42
				Total Load:	11160 VA		7403 VA		6043 VA						
				Total Amps:	95 A		63 A		50 A						

Panel Totals:
Total Conn. Load: 24606 VA
Total Est. Demand: 22136 VA
Total Conn. Current: 68 A
Total Est. Demand Current:... 61 A

Legend:

Notes:

BRANCH PANEL: LP-1

Location: STORAGE W1082
Supply From: SB-1
Mounting: Surface
Enclosure: Type 1

Volts: 480/277 Wye
Phases: 3
Wires: 4

A.I.C. Rating:
Mains Type: MCB
Mains Rating: 100 A
MCB Rating: 100 A

CKT	Circuit Description	Trip	Poles	Wire Size	A		B		C		Wire Size	Poles	Trip	Circuit Description	CKT
1	LTG, W1281, W1278, W1285	20 A	1	2#12 & 1#12G, 3/4"C.	260 VA	358 VA					2#12 & 1#12G, 3/4"C.	1	20 A	LTG, W1081, W1276, W1277,...	2
3	LTG, W1072	20 A	1	2#12 & 1#12G, 3/4"C.			764 VA	764 VA			2#12 & 1#12G, 3/4"C.	1	20 A	LTG, W1114, W1072	4
5	LTG, W010, W1012, W013	20 A	1	2#12 & 1#12G, 3/4"C.					556 VA	650 VA	2#12 & 1#12G, 3/4"C.	1	20 A	LTG, W1010, W1061, W1001,...	6
7	LTG, W1012, W1013	20 A	1	2#12 & 1#12G, 3/4"C.	538 VA	507 VA					2#12 & 1#12G, 3/4"C.	1	20 A	LTG, W1012, W1013	8
9	LTG, W1011, W1013	20 A	1	2#12 & 1#12G, 3/4"C.			427 VA	507 VA			2#12 & 1#12G, 3/4"C.	1	20 A	LTG, W1012, W1013	10
11	LTG, W1114	20 A	1	2#12 & 1#12G, 3/4"C.					764 VA	424 VA	2#12 & 1#12G, 3/4"C.	1	20 A	LTG, W1011, W1013, W1005,...	12
13	EXTERIOR EGRESS...	20 A	1	2#12 & 1#12G, 3/4"C.	816 VA										14
15															16
17															18
19															20
21															22
23															24
25															26
27															28
29															30
31															32
33															34
35															36
37															38
39															40
41															42
				Total Load:	2471 VA		2462 VA		2390 VA						
				Total Amps:	9 A		9 A		9 A						

Panel Totals:
Total Conn. Load: 7323 VA
Total Est. Demand: 7526 VA
Total Conn. Current: 9 A
Total Est. Demand Current:... 9 A

Legend:

Notes:

BRANCH PANEL: LP-2

Location: JANITOR W1172
Supply From: SB-2
Mounting: Surface
Enclosure: Type 1

Volts: 480/277 Wye
Phases: 3
Wires: 4

A.I.C. Rating:
Mains Type: MCB
Mains Rating: 100 A
MCB Rating: 100 A

CKT	Circuit Description	Trip	Poles	Wire Size	A		B		C		Wire Size	Poles	Trip	Circuit Description	CKT
1	LTG, W1231	20 A	1	2#12 & 1#12G, 3/4"C.	821 VA	764 VA					2#12 & 1#12G, 3/4"C.	1	20 A	LTG, W1231, W1183	2
3	LTG, W1183	20 A	1	2#12 & 1#12G, 3/4"C.			764 VA	351 VA			2#12 & 1#12G, 3/4"C.	1	20 A	LTG, W1271, W1272, W1268,...	4
5	LTG, W1183	20 A	1	2#12 & 1#12G, 3/4"C.					764 VA	764 VA	2#12 & 1#12G, 3/4"C.	1	20 A	LTG, W1141	6
7	LTG, ,W1141	20 A	1	2#12 & 1#12G, 3/4"C.	764 VA	1020 VA					2#12 & 1#12G, 3/4"C.	1	20 A	EXTERIOR EGRESS...	8
9															10
11															12
13															14
15															16
17															18
19															20
21															22
23															24
25															26
27															28
29															30
31															32
33															34
35															36
37															38
39															40
41															42
				Total Load:	3369 VA		1112 VA		1528 VA						
				Total Amps:	12 A		4 A		6 A						

Panel Totals:
Total Conn. Load: 6008 VA
Total Est. Demand: 6263 VA
Total Conn. Current: 7 A
Total Est. Demand Current:... 8 A

Legend:

Notes:

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Revisions

No.	Date	Description

Project No.: **Project Number**
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Drawn By:
Checked By: **CMC**
Issue Date: **30-NOV-2020**
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Drawing Title:

PANEL SCHEDULES

BID DOCUMENT

Drawing No.:

E603

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LIGHTING FIXTURE SCHEDULE

TYPE	DESCRIPTION	MANUFACTURER*	LAMP	VOLTS	WATTS	CATALOG NUMBER*	MOUNTING	TOTAL FIXTURE QUANTITY
A1	8FT LED RECESSED LINEAR	LUMAX	LED	277	44 VA	N2LEDG43L4K96	RECESSED	143
A2	4FT LED RECESSED LINEAR	LUMAX	LED	277	31 VA	N2LEDG29L4K48	RECESSED	150
B1	6" LED DOWNLIGHT	HALO	LED	277	10 VA	HC610D010-HM612840-61WDWB	RECESSED	158
C1	4FT LED PENDANT INDUSTRIAL	METALUX	LED	277	31 VA	4SNLED-LD5-41SL-LN-UNV-L840-CD1-U	PENDANT 12' AFF	42
D1	2X2 LED RECESSED TROFFER	METALUX	LED	277	20 VA	22GR-LD5-24-F1-UNV-L840-CD1-U	RECESSED	28
X	EXIT SIGN WITH CHEVRONS AS INDICATED ON PLAN	HE WILLIAMS	LED	277	6 VA	EXIT-R-AC-WHT-D	SURFACE	19
X1	CROSSTOUR MAXX LED EXTERIOR WALL PACK WALKWAY LIGHTING	COOPER LIGHTING	LED	277	102 VA	XTOR12BWBZPC2	SURFACE	18

* OR APPROVED EQUAL FOR ALL PRODUCTS LISTED

LIGHTING CONTROL COMPONENT SCHEDULE

SYMBOL	DESCRIPTION	TYPE	MOUNTING	MANUFACTURER	MODEL NUMBER	TYPICAL COVERAGE	NOTES	TOTAL
OS_a	DUAL TECHNOLOGY CEILING SENSOR SET TO AUTO ON/OFF	DUAL TECHNOLOGY	CEILING	ACUITY	CMR-PDT-10	OPEN AREAS, TSA, HOLD ROOMS (36FT RADIAL COVERAGE)	LOWER CASE LETTER DENOTES SWITCHING ZONE. SET TO 50% AUTOMATIC ON, 100% WITH LOCAL OVERRIDE. PROVIDE EACH ZONE WITH POWER PACK. ACUITY # PP20. PROVIDE 0-10V WIRING FROM SENSOR TO CONTROLLED LIGHTING FIXTURES PER MANUFACTURER'S INSTRUCTIONS.	23
		120-277V TOGGLE	WALL	EATON	CS315			14
S_{LV} e,f	2 ZONE LOW VOLTAGE OVERRIDE SWITCH	OVERRIDE	WALL	ACUITY	LVPS-2BT		LOWER CASE LETTER DENOTES SWITCHING ZONES.	5
S_{OS}	DUAL TECHNOLOGY COMBINATION WALL MOUNTED OCCUPANCY SWITCH	DUAL TECHNOLOGY	WALL	ACUITY	WSX-PDT	SMALL ROOMS (20FT RADIAL COVERAGE)		10
S	SINGLE POLE 120-277V TOGGLE SWITCH	120-277V TOGGLE	WALL	EATON	CS115	UTILITY ROOMS		15

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Drawing Title:

LIGHTING FIXTURE SCHEDULE

BID DOCUMENT

Drawing No.:

E604

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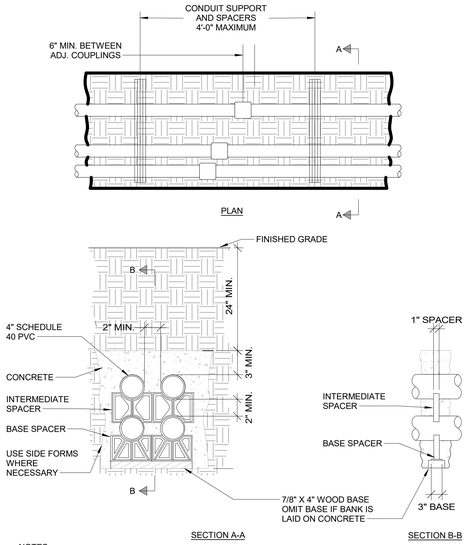


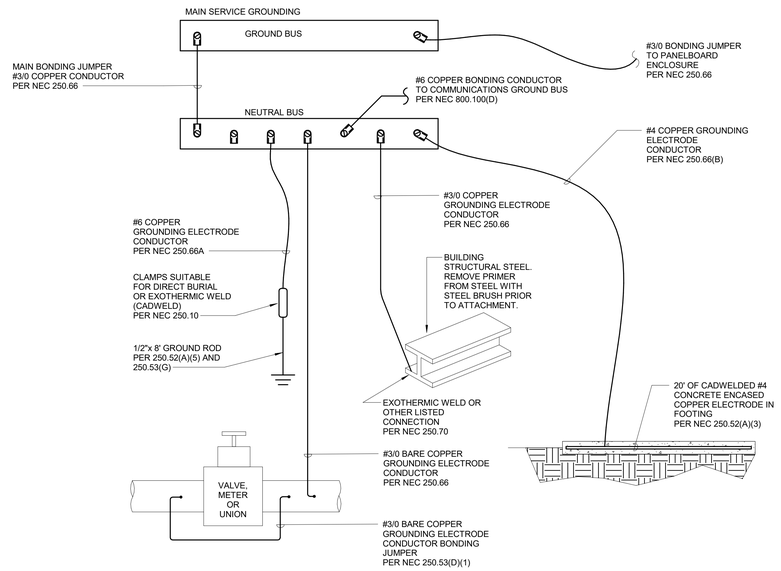
NOTES:

1. FOR SIZE AND NUMBER OF CONDUITS AS WELL AS DUCT BANK FORMATION, SEE PLANS.
2. AVOID OVER-EXCAVATION OF THE DUCTBANK TRENCH. DUCTBANK WALLS SHALL BE FORMED WITHIN 5 FEET OF A MANHOLE, WITHIN A "COMMON" UTILITIES TRENCH, AND IF THE WIDTH OF THE POUR WILL EXTEND BEYOND THE DIMENSION SHOWN ON THE DETAIL.
3. INSPECTION AND SIGN-OFF BY UNIVERSITY REPRESENTATIVE IS REQUIRED AFTER THE DUCTBANK BASE IS POURED AND THE CONDUITS ARE INSTALLED, BUT PRIOR TO FINAL CONCRETE ENCASEMENT.

1 CONCRETED_ENCASED_DUCT_BANK_DETAIL
N.T.S.

EXAMPLE:
MAIN DISTRIBUTION FEED IS
FOUR SETS OF (4) 350KCMIL
AND (1)#3/0 GND IN 4" CONDUIT

NOTE:
ALL GROUNDING ELECTRODES THAT ARE PRESENT SHALL BE BONDED TOGETHER TO FORM THE GROUNDING ELECTRODE SYSTEM. WHERE NONE OF THESE GROUNDING ELECTRODES EXIST, ONE OR MORE OF THE GROUNDING ELECTRODES SHALL BE INSTALLED. FURTHERMORE, IF THE ONLY ELECTRODE AVAILABLE IS THE WATER PIPE, A SUPPLEMENTAL ELECTRODE IS REQUIRED.



2 GROUNDING_ELECTRODE_DETAIL
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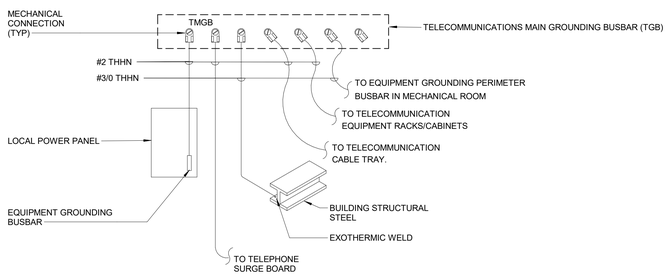

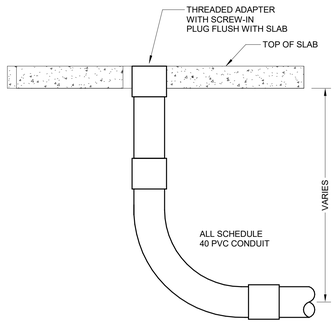

3 CONDUIT_STUB_UP_DETAIL
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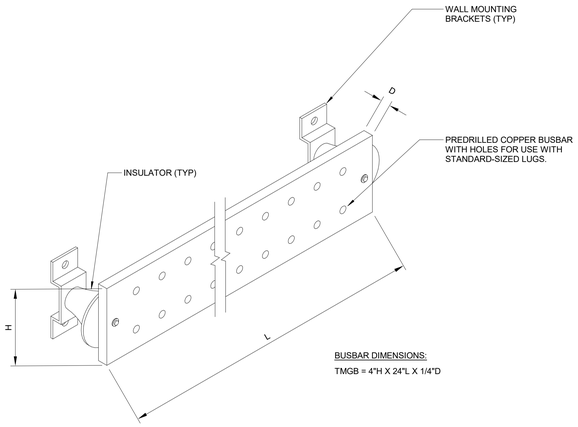

4 TELECOMMUNICATIONS_GROUNDING_DETAIL
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DETAILS - ELECTRICAL

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Drawing No.:

E801

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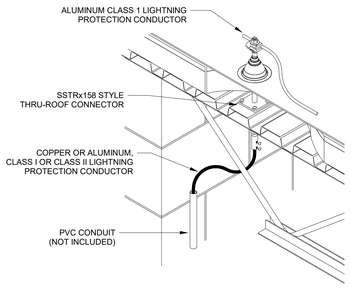
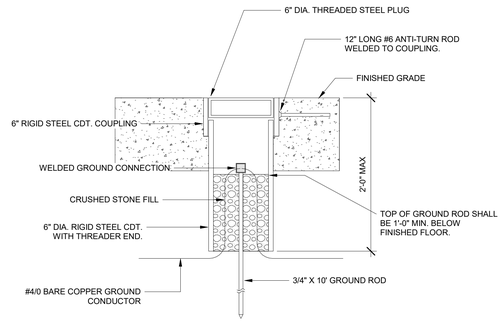
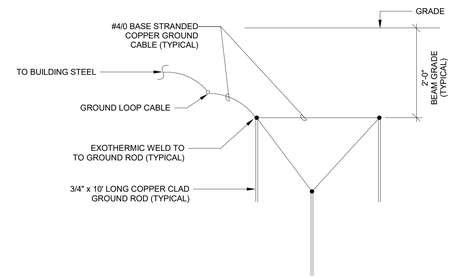


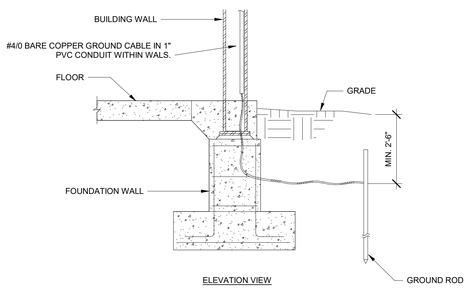
1 SSTRx158_-_STYLE_THRU-ROOF_CONNECTOR
N.T.S.



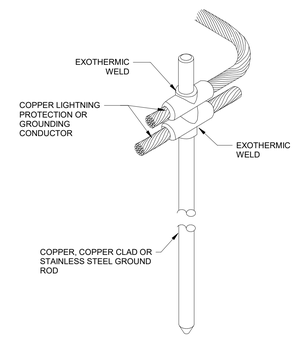
2 GROUND_CONDUCTOR_TEST_WELL_DETAIL
N.T.S.



3 GROUND_ROD_COUNTERPOISE_DETAIL
N.T.S.



4 TYPICAL_LIGHTNING_DOWN_CONDUCTOR_GROUNDING_DETAIL
N.T.S.



6 GROUND_ROD_DETAIL_EXOTHERMIC_WELD
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Drawn By:	JJS
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DETAILS - ELECTRICAL 2

BID DOCUMENT

Drawing No.:

E802

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MOUNTING HEIGHTS

CEILING	SMOKE AND HEAT DETECTORS, 360° SECURITY MOTION DETECTORS, CCTV SURVEILLANCE CAMERAS, PUBLIC ADDRESS AND VOICE EVACUATION SPEAKERS, WIRELESS ACCESS POINTS. TV AND LCD PROJECTOR JACKS
8' A.F.G.	EXTERIOR VISUAL AND AUDIO/VISUAL FIRE ALARM NOTIFICATION DEVICES, EXTERIOR PUBLIC ADDRESS SPEAKERS.
7'-5" A.F.F.	CLOCKS, COMBINATION CLOCK/SPEAKERS, TRUMPET SPEAKERS
7'-0" A.F.F.	VISUAL AND AUDIO/VISUAL FIRE ALARM NOTIFICATION DEVICES, WALL MOUNTED SECURITY MOTION DETECTORS (CENTER OF DEVICE)
6" ABOVE DOOR JAMB	REQUEST TO EXIT MOTION DETECTORS
5'-6" A.F.F	TOP OF PLYWOOD TELEPHONE BACKBOARD
5'-4" A.F.F.	FIRE ALARM ANNUNCIATOR PANELS, FIRE FIGHTER CONTROL STATIONS, SECURITY ANNUNCIATOR PANELS, VISUAL DISPLAYS, TACTILE DISPLAYS
4'-8" A.F.G. MAX	PEDESTAL MOUNT INTERCOM PEDESTAL MOUNT CARD READER
4'-0" A.F.F.	"PS" TELEPHONE OUTLETS (TOP OF COIN SLOT),(WALL MOUNTED)-TELEPHONE INSTRUMENTS, INTERCOM STATIONS, FIRE FIGHTER TELEPHONE JACKS, FIRE ALARM MANUAL STATIONS, CARD READERS, MANUAL REQUEST TO EXIT DEVICES, WALL MOUNTED DURESS ALARM STATIONS, RESCUE ASSISTANCE PANELS, LCD KEYPADS (CENTER OF DEVICE)
UNDER COUNTER OR DESK	DURESS ALARM BUTTONS, DOOR RELEASE BUTTOMS
1'-6" A.F.F.	DATA/TELEPHONE JACKS, LOW TELEVISION JACKS, MICROPHONE JACKS
0'-0"	IN FLOOR JUNCTION BOXES FLUSH TO FINISHED FLOOR (FF) (DATA, TELEPHONE, MICROPHONE, MEDIA)

1. IN MASONRY CONSTRUCTION THE MOUNTING HEIGHTS SHALL BE USED FOR REFERENCE TO THE NEAREST BLOCK OR BRICK COURSING.
2. THE ABOVE MOUNTING ELEVATIONS ARE TO CENTER OF DEVICE AND SHALL BE ADHERED TO UNLESS SPECIFICALLY NOTED OR DETAILED OTHERWISE ON THE DRAWINGS AND/OR SPECIFICATIONS.
3. COORDINATE THE INSTALLATION AND MOUNTING ELEVATIONS OF ALL EQUIPMENT, DEVICES, CONTROLS AND APPURTENANCES WITH ARCHITECT AND ALL AFFECTED TRADES PRIOR TO INSTALLATION. DOCUMENT ALL MOUNTING ELEVATIONS FOR ALL EQUIPMENT, DEVICES, CONTROLS AND APPURTENANCES AT THE TIME OF SHOP DRAWING SUBMITTAL

FIRE ALARM ABBREVIATIONS

AFC	ABOVE FINISHED CEILING	LED	LIGHT EMITTING DIODE
AFF	ABOVE FINISHED FLOOR	LTG	LIGHTING
AFG	ABOVE FINISHED GRADE	LA	LIGHTNING ARRESTER
ADJ	ADJUSTABLE	LV	LOW VOLTAGE
AC	ALTERNATING CURRENT	MCB	MAIN CIRCUIT BREAKER
AL	ALUMINUM	MDP	MAIN DISTRIBUTION PANEL
ADA	AMERICAN DISABILITIES ACT	MLO	MAIN LUGS ONLY
ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE	MH	MANHOLE
AWG	AMERICAN WIRE GAUGE	MTS	MANUAL TRANSFER SWITCH
AM	AMMETER	MFR	MANUFACTURER
A/AMP	AMPERE	MATV	MASTER ANTENNA TELEVISION
AMP	AMPERE	MC	MECHANICAL CONTRACTOR
APPROX	APPROXIMATELLY	MV	MEDIUM VOLTAGE
ASY	ASYMETRIC	MH	METAL HALIDE
ATS	AUTOMATIC TRANSFER SWITCH	MCC	METAL-CLAD CABLE
BATT	BATTERY	MM	MILLIMETER
BFC	BELOW FINISHED CEILING	MV	MILLIVOLT
BLK	BLACK	MISC	MISCELLANEOUS
BRKT	BRACKET	MCP	MOTOR CIRCUIT PROTECTOR
BKR	BREAKER	MCC	MOTOR CONTROL CENTER
BLDG	BUILDING	MOD	MOTOR OPERATED DAMPER
CAB	CABINET	MTD	MOUNTED
CATV	CABLE TELEVISION	MTG HT	MOUNTING HEIGHT
CD	CANDELA	NEC	NATIONAL ELECTRIC CODE
CLG	CEILING	NEMA	NATIONAL ELECTRIC MFR ASSOCIATION
CIR/CKT	CIRCUIT	NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
CB	CIRCUIT BREAKER	NEXT	NEAR END CROSSTALK
CLR	CLEAR	NL	NIGHT LIGHT
CCTV	CLOSED CIRCUIT TELEVISION	NO	NORMALLY OPENED
COL	COLUMN	N/A	NOT AVAILABLE/NOT APPLICABLE
COMM	COMMUNICATION	NIC	NOT IN CONTRACT
C	CONDUIT	NTS	NOT TO SCALE
CW	COOL WHITE	OC	ON CENTER
CU	COPPER	OH	OVERHEAD
CLF	CURRENT LIMITING FUSE	OL	OVERLOAD HEATER ELEMENT
CT	CURRENT TRANSFORMER	PNL	PANEL
dB	DECIBEL	PEW	PEWTER
DED	DEDICATED	PLY	PLYWOOD
DIA	DIAMETER	P	POLE
DC	DIRECT CURRENT	PVC	POLYVINYL CHORIDE
DISC	DISCONNECT	PT	POTENTIAL TRANSFORMER
DP	DISTRIBUTION PANEL	PP	POWER PANEL
DPDT	DOUBLE POLE DOUBLE-THROW	PB	PULL BOX
DNLT	DOWNLIGHT	RS	RAPID START
DWG	DRAWING	RECPT	RECEPTACLE
DE	DUAL ELEMENT	REFL	REFLECTOR
EA	EACH	(RE)	RELOCATE EXISTING
ELEC	ELECTRICAL	(R)	REMOVE
EC	ELECTRICAL CONTRACTOR	REQ	REQUIRED
EO	ELECTRICALLY OPERATED	RGS	RIGID GALVANIZED STEEL CONDUIT
ELEV	ELEVATOR	RM	ROOM
E	EMERGENCY	RIO	ROUGH IN ONLY
EQIP	EQUIPMENT	SCH	SCHEDULE
EF	EXHAUST FAN	SPST	SINGLE POLE DOUBLE THROW
(E)	EXISTING TO REMAIN	SPDT	SINGLE POLE SINGLE THROW
XP	EXPLOSION PROOF	SSB	SOLID STATE BALLAST
FEXT	FAR END CROSSTALK	SW	SWITCH
FA	FIRE ALARM	SWBD	SWITCHBOARD
FAA	FIRE ALARM ANNUNCIATOR	SWGR	SWITCHGEAR
FAAP	FIRE ALARM ANNUNCIATOR PANEL	TSB	TECHNICAL SERVICE BULLETIN
FACP	FIRE ALARM CONTROL PANEL	TIA	TELECOMMUNICATIONS INDUSTRY ASSOCIATION
FAGP	FIRE ALARM GRAPHIC ANNUNCIATOR PANEL	TELE	TELEPHONE
FIXT	FIXTURE	XFMR	TRANSFORMER
FL	FLOOR	TT	TWIN TUBE
FT	FOOTCANDLES	TSP	TWISTED SHIELDED PAIR
FLA	FULL LOAD AMPERES	TYP	TYPICAL
FVNR	FULL VOLTAGE NON-REVERSING	UL	UNDERWRITER'S LABORATORIES
GC	GENERAL CONTRACTOR	UPS	UNINTERRUPTABLE POWER SUPPLY
GEN	GENERATOR	UON	UNLESS OTHERWISE NOTED
GND/G	GROUND	UTP	UNSHIELDED TWISTED PAIR
GFI	GROUND FAULT INTERRUPTER	VP	VAPOR PROOF
HH	HAND HOLE	V	VOLT
HVAC	HEATING VENTILATING AIR CONDITIONING	VM	VOLTMETER
HZ	HERTZ	WITHIN	W/I
HID	HIGH INTENSITY DISCHARGE	WITHOUT	W/O
HPF	HIGH POWER FACTOR	WW	WARM WHITE
HV	HIGH VOLTAGE	W	WATT
HP	HORSEPOWER	WP	WEATHERPROOF
IPS	INVERTER POWER SUPPLY	W/	WITH
IG	ISOLATED GROUND		
JB	JUNCTION BOX		
KVAR	KILOVAR (REACTANCE)		
KVA	KILOVOLT AMPERE		
KW	KILOWATT		
KWH	KILOWATT HOUR METER		
LT	LIGHT		

FIRE ALARM SYMBOL LEGEND

FACP	ADDRESSABLE FIRE ALARM CONTROL PANEL	FCPS	FIELD CHARGING POWER SUPPLY
FAAP	REMOTE LCD ANNUNCIATOR PANEL	FFCS	FIRE FIGHTERS COMMAND STATION
GAP	FIRE ALARM GRAPHIC ANNUNCIATOR PANEL	F XX	ADDRESSABLE FIRE ALARM MANUAL PULL STATION WG = LEXAN COVER W/SELF CONTAINED HORN WP = WEATHER PROOF I = INSTITUTION GRADE
MRAP	MASTER RESCUE ASSISTANCE PANEL		
VDP	COLOR VIDEO DISPLAY TERMINAL	F XX	HORN/STROBE UNIT SYNCRONIZED WALL MOUNT WG - WIRE GUARD WP - WEATHER PROOF
FS	CONNECTION SPRINKLER INITIATING DEVICE		
FS	CONNECTION SPRINKLER SUPERVISORY DEVICE	F XX	HORN UNIT WALL MOUNT WG - WIRE GUARD WP - WEATHER PROOF
	MAGNETIC DOOR HOLDER		END OF LINE SUPERVISORY DEVICE
M	ADDRESSABLE MONITOR MODULE	F XX	BELL UNIT WG - WIRE GUARD WP - WEATHER PROOF
BD XX	BEAM DETECTOR T - TRANSMITTER R - RECEIVER	P XX	STROBE UNIT SYNCRONIZED CEILING (XX-CD = CANDELA RATING) C = CEILING MTG. 110 CANDELA. WP = WEATHER PROOF WG = WIRE GUARD
C	ADDRESSABLE CONTROL MODULE		
H XX	ADDRESSABLE THERMAL DETECTOR COMBINATION RATE OF RISE AND FIXED TEMPERATURE SET AT 135 DEGREES F.	F XX	BELL/STROBE UNIT SYNCHRONIZED WALL MOUNT (XX-CD = CANDELA RATING) WG = WIRE GUARD WP = WEATHER PROOF
H XX	CONVENTIONAL THERMAL DETECTOR RC - RATE COMPENSATING TEMPERATURE SET AT 190 DEGREES F. AC - ABOVE CEILING - COMBINATION RATE OF RISE AND FIXED TEMPERATURE SET AT 135 DEGREES F. (INSTALLED ABOVE ACCESSIBLE CEILING) FX - FIXED TEMPERATURE SET AT 190 DEGREES F.	S	SPEAKER UNIT
S XX	ADDRESSABLE PHOTOELECTRIC SMOKE DETECTOR WG - WIRE GUARD U - UNDER RAISED FLOOR DETECTION	S XX	SPEAKER/STROBE UNIT SYNCRONIZED CEILING MOUNT (XX-CD = CANDELA RATING) WG = WIRE GUARD
D D	ADDRESSABLE DUCT SMOKE DETECTOR S = SUPPLY R = RETURN	S XX	SPEAKER/STROBE UNIT SYNCRONIZED WALL MOUNT (XX-CD = CANDELA RATING) WG = WIRE GUARD
GDP	DATA GATHERING PANEL (REMOTE TRANSPONDER)	S	SPEAKER UNIT WALL MOUNT
RAP	REMOTE RESCUE ASSISTANCE PANEL		

NOTE:

THIS IS A STANDARD SYMBOL LIST. ALL SYMBOLS MAY NOT APPEAR ON THIS PROJECT.

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Checked By:	JB
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Drawing Scale:	

Drawing Title:
FIRE ALARM - LEGEND, SYMBOLS & ABBREVIATIONS
BID DOCUMENT

Drawing No.:
FA000

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ROOM SPACING FOR WALL-MOUNTED VISIBLE APPLIANCES MINIMUM REQUIRED LIGHT

OUTPUT (EFFECTIVE INTENSITY/CANDELA) IN ACCORDANCE WITH NFPA 72

MAXIMUM RM. SIZE	ONE LIGHT PER ROOM	TWO LIGHTS PER ROOM	FOUR LIGHTS PER ROOM
20 X 20	15cd	N/A	N/A
30 X 30	30cd	15cd	N/A
40 X 40	60cd	30cd	15cd
50 X 50	95cd	60cd	30cd
60 X 60	135cd	95cd	30cd
70 X 70	185cd	95cd	30cd
80 X 80	240cd	135cd	60cd
90 X 90	305cd	185cd	95cd
100 X 100	375cd	240cd	95cd
110 X 110	455cd	240cd	135cd
120 X 120	540cd	305cd	135cd
130 X 130	635cd	375cd	185cd

NA = NOT ALLOWABLE.

NOTE: CONTRACTOR WILL PROVIDE REQUIRED CANDELA RATED STROBES IN ACCORDANCE WITH THE ABOVE TABLE FOR ALL VISIBLE APPLIANCES BASED ON LOCATION AS INDICATED ON THE CONTRACT

NFPA 72 PERFORMANCE CRITERIA

ALARM CAPABILITY DURING ABNORMAL CONDITIONS		
TROUBLE INDICATION AT PROTECTED PREMISES		
ABNORMAL CONDITION	5	6
SINGLE OPEN	X	
SINGLE GROUND	X	X
WIRE-TO-WIRE SHORT	X	

NOTIFICATION APPLIANCE CIRCUITS

NFPA - CLASS B - STYLE Y

NOTIFICATION CIRCUITS NOTE:
THE ALARM SIGNAL DEVICES DO NOT HAVE TO BE WIRED SEQUENTIALLY BUT THEY:
-WILL BE INSTALLED IN ACCORDANCE WITH THE SPECIFICATIONS
-WILL HAVE AN EOL
-WILL NOT BE T-TAPPED
-MUST BE IN CONDUIT

ALARM CAPABILITY DURING ABNORMAL CONDITIONS		
TROUBLE INDICATION AT PROTECTED PREMISES		
ALARM		
ABNORMAL CONDITION	X	
SINGLE OPEN	X	
SINGLE GROUND	X	R
WIRE-TO-WIRE SHORT	X	
WIRE-TO-WIRE SHORT & OPEN	X	
WIRE-TO-WIRE SHORT & GROUND	X	
OPEN & GROUND	X	
LOSS OF CARRIER(IF USED)/ CHANNEL INTERFACE	X	

SIGNALING LINE CIRCUITS (SLC)

NFPA - CLASS B - STYLE 4

INITIATION LOOP (SLC) NOTE:
THE ALARM INITIATION DEVICES DO NOT HAVE TO BE WIRED SEQUENTIALLY BUT THEY:
-WILL BE INSTALLED IN ACCORDANCE WITH THE SPECIFICATIONS
-DO NOT HAVE AN EOL
-MAY BE T-TAPPED
-MAY HAVE UNIQUE ADDRESSES
-SHALL BE IN CONDUIT

ADDRESSABLE FIRE ALARM SYSTEM WIRE SCHEDULE

DESCRIPTION	TYPICAL DEVICES	NEC CLASSIFICATION	CABLE	TWISTED	No. OF CONDUCTORS	SHIELDED	NFPA CLASS	NFPA STYLE	IN CONDUIT	NOTES
ADDRESSABLE INITIATING LOOP (SLC)	MANUAL STATIONS, SMOKE/HEAT DETECTORS, INTERFACE MODULES	POWER-LIMITED	16 AWG	YES	2	PER MANUF.	B	4	YES	T-TAPPING PERMITTED, BUT DISCOURAGED, NO EOL'S.
NOTIFICATION APPLIANCE CIRCUIT (NAC)	HORNS, STROBES, BELLS	POWER-LIMITED	14 AWG	NO	2	NO	B	Y	YES	NO T-TAPPING, CIRCUITS FROM FACP'S: REQUIRED EOL. CIRCUITS FROM FCPS: REQUIRED EOL.
NOTIFICATION APPLIANCE CIRCUIT (NAC)	SPEAKERS	POWER-LIMITED	16 AWG	YES	2	YES	B	Y	YES	NO T-TAPPING, CIRCUITS FROM FACP'S: REQUIRED EOL. CIRCUITS FROM AMPLIFIERS/DGPS': REQUIRED EOL.
24 VDC POWER	REMOTE ANNUNCIATORS, CONTROL MODULES, BEAM DETECTORS	POWER-LIMITED	14 AWG	NO	2	NO	B	N/A	YES	T-TAPPING PERMITTED.
PRINTER CABLE	PRINTER	POWER-LIMITED	-	YES	-	NO	N/A	N/A	YES	MAX. 25FT CABLE RUN (GREATER THAN 25FT IN LENGTH CONTRACTOR SHALL PROVIDE APPROPRIATE MODEMS)
RS485-TRANSPONDER NETWORK (SLC)	COMMUNICATION BETWEEN FACP'S AND TRANSPONDERS	POWER-LIMITED	18 AWG	YES	2	PER MANUF.	A	7a	YES	NO T-TAPPING, 5000 FT MAX CABLE RUN.
CONVENTIONAL INITIATING LOOP (IDC)	CONVENTIONAL HEAT DETECTORS, BEAM DETECTORS	POWER-LIMITED	14 AWG	NO	2	YES	B	Y	YES	NO TAPPING, MANUFACTURERS REQUIRED EOL

ADDRESSABLE FIRE ALARM SYSTEM CABLE TYPE

NEC DESIGNATION *	DESCRIPTION	APPLICATION	CONDUCTOR MATERIAL	ACCEPTABLE FOR PROJECT
FPLP	FIRE, POWER LIMITED, PLENUM	SUITABLE FOR USE IN DUCTS, PLENUMS, AND OTHER SPACE USED FOR ENVIRONMENTAL AIR.	COPPER	NO
FPLR	FIRE, POWER LIMITED, RISER	SUITABLE FOR USE IN A VERTICAL RUN IN A SHAFT OR WHEN A WIRE RUN PASSES FROM FLOOR TO FLOOR.	COPPER	NO
FPL	FIRE, POWER LIMITED	SUITABLE FOR GENERAL-PURPOSE FIRE ALARM USE IN CONDUITS, WITH THE EXCEPTIONS OF THE ABOVE APPLICATIONS.	COPPER	YES

* CABLE TYPES ARE LISTED IN DESCENDING ORDER OF FIRE-RESISTANT RATING, PER NFPA 70, TABLE 760-71(h)

GENERAL FIRE ALARM SYSTEM NOTES:

1. THE FOLLOWING GENERAL NOTES AS LISTED BELOW APPLY TO ALL FIRE ALARM SYSTEM SCOPES OF WORK AS INDICATED ON THE FA SERIES DRAWINGS.
2. ALL EQUIPMENT SYMBOLS ARE SHOWN ON DRAWINGS AS CLOSE AS POSSIBLE TO THEIR INTENDED LOCATION. CONTRACTOR WILL COORDINATE IN THE FIELD THE PROPER INSTALLATION OF ALL EQUIPMENT, DEVICES, CONTROLS AND CABLING. REFER TO RELATED SPECIFICATION SECTIONS FOR ADDITIONAL REQUIREMENTS.
3. DRAWINGS FOR THIS WORK ARE DIAGRAMMATIC AND INTENDED TO CONVEY THE EXTENT, GENERAL ARRANGEMENT AND LOCATIONS OF THE WORK. BECAUSE OF THE SCALE OF THE DRAWINGS, CERTAIN BASIC ITEMS SUCH AS ACCESS PANELS, CONDUITS, CABINET SIZES, PENETRATION SLEEVES, PULL BOXES, BACKBOXES AND JUNCTION BOXES MAY NOT BE SHOWN. INCLUDE ALL ITEMS WHERE REQUIRED BY CODE, MANUFACTURER AND RELATED SPECIFICATION SECTIONS FOR THE PROPER INSTALLATION OF ALL WORK.
4. THE SYSTEM WILL BE INSTALLED IN ACCORDANCE WITH ARTICLE 760 OF THE NATIONAL ELECTRIC CODE. ALL FIRE ALARM CABLE MUST BE INSTALLED IN DEDICATED CONDUITS IN ACCORDANCE WITH THE CABLING REQUIREMENTS SPECIFIED BY THE CONTRACT DOCUMENTS.
5. FIRE ALARM DEVICE MOUNTING HEIGHTS WILL COMPLY WITH ALL ANSI 117, NFPA 72 AND IBC REQUIREMENTS, AT THE MINIMUM INSTALL ALL DEVICES AS FOLLOWS:
   - MANUAL PULL STATION: 48" A.F.F. TO CENTER
   - AUDIBLE/VISUAL: 7'-0" A.F.F. TO BOTTOM OF STROBE LENS OR 8" BELOW CEILING TO CENTER OF STROBE LENS.
   - VISUAL: 7'-0" A.F.F. TO BOTTOM OF STROBE LENS OR 8" BELOW CEILING TO CENTER OF STROBE LENS.
   - EMERGENCY TELEPHONE JACKS: 48" A.F.F. TO CENTER
6. COORDINATE WITH ALL TRADES AND INTEGRATORS ALL CONDITIONS RELATED TO THE INSTALLATION OF ALL DEVICES. THE CONTRACTOR SHALL COORDINATE WITH THE APPROPRIATE TRADES AND SYSTEM INTEGRATORS ALL INSTALLATION REQUIREMENTS IMPACTING THE PLACEMENT OF ALL SYSTEM COMPONENTS TO THE SATISFACTION OF ALL CONCERNED TRADES.
7. ALL EQUIPMENT CLEARANCES WILL BE IN ACCORDANCE WITH NFPA 70 REQUIREMENTS. ARRANGE EQUIPMENT TO FACILITATE UNRESTRICTED ACCESS FOR MAINTENANCE AND SERVICE AROUND ALL EQUIPMENT, COMPONENTS AND/OR CABLE TERMINATIONS.
8. COORDINATE EXACT LOCATION(S) OF ALL CEILING MOUNTED CABLE, CONDUITS, EQUIPMENT AND/OR DEVICES WITH ALL ARCHITECTURAL PLANS, REFLECTED CEILING PLANS AND AFFECTED TRADES PRIOR TO INSTALLATION.
9. WHERE EQUIPMENT AND/OR JUNCTION BOXES ARE INSTALLED ABOVE FINISHED CEILINGS, THE CONTRACTOR WILL PROVIDE ACCESS HATCHES LISTED FOR THE INTENDED APPLICATION. ACCESS HATCHES SHALL BE LOCATED SO THAT SERVICE ACCESS TO THE EQUIPMENT AND/OR JUNCTION BOXES IS UNIMPEDED.
10. THE FIRE ALARM SYSTEM WILL BE INSTALLED IN DEDICATED CONDUITS. ALL CONDUITS SHALL BE INSTALLED IN ACCORDANCE WITH NFPA 70 AND THE CONTRACT DOCUMENTS. ALL CONDUITS SHALL BE SIZED IN ACCORDANCE WITH NFPA 70 AND WILL BE A MINIMUM OF 3/4" UNLESS OTHERWISE NOTED. REFER TO RELATED SPECIFICATION SECTIONS FOR ADDITIONAL INFORMATION.
11. ALL CONDUITS/RACEWAYS WILL BE INSTALLED IN A MANNER THAT PREVENTS TAMPERING OR REMOVAL WHEN INSTALLED IN AREAS EXPOSED TO THE GENERAL POPULATION. PROVIDE TAMPER-RESISTANT INSTALLATION UTILIZING "TORX WITH PEG" SECURITY-FASTENING DEVICES FOR ALL CONDUITS/RACEWAYS, EQUIPMENT, DEVICES AND APPURTENANCES IN ALL AREAS ACCESSIBLE TO THE GENERAL POPULATION AND/OR AREAS SUBJECTED TO TAMPERING OR VANDALISM. REFER TO RELATED SPECIFICATION SECTIONS FOR ADDITIONAL INFORMATION.
12. APPROVED EARTH GROUND WILL BE PROVIDED AT FIRE ALARM CONTROL PANEL CHASSIS. A CONDUIT GROUNDING TO BUILDING STEEL SHALL NOT BE CONSIDERED A ACCEPTABLE METHODOLOGY FOR GROUNDING OF FIRE ALARM CONTROL PANEL.
13. ALL SYSTEM WIRING AND EQUIPMENT INSTALLATIONS WILL BE IN ACCORDANCE WITH GOOD ENGINEERING PRACTICES AND BY ALL IEEE, EIA, NEC AND MANUFACTURER'S REQUIREMENTS. WIRING WILL COMPLY WITH ALL STATE AND LOCAL ELECTRICAL CODES. ALL WIRING WILL TEST FREE FROM ALL GROUNDS, SHORTS AND EMI.
14. NO A.C. CARRYING CONDUCTORS ARE PERMITTED TO SHARE RACEWAYS WITH ANY FIRE ALARM INITIATING AND/OR NOTIFICATION CIRCUITS.
15. ALL AC ELECTRICAL CIRCUITS FEEDING THE FIRE ALARM CONTROL EQUIPMENT WILL BE EQUIPPED WITH DEDICATED CIRCUIT BREAKER LOCKOUT DEVICE IN ACCORDANCE WITH NFPA 72.
16. ALL WIRES AND CIRCUITS WILL BE METERED TO ENSURE THEY ARE FREE OF ANY GROUNDS AND SHORTS PRIOR TO COMMISSIONING OF THE SYSTEM.
17. ALL AUXILIARY ALARM RELAYS WILL BE INSTALLED WITHIN 3 FEET OF THE EQUIPMENT TO BE CONTROLLED IN ACCORDANCE WITH ALL NFPA 72 REQUIREMENTS.
18. ALL FIRE ALARM DEVICES AND EQUIPMENT WILL BE LABELED UNIQUE IDENTIFICATION NUMBER. ALL NUMBERS WILL CORRESPOND WITH NUMBERING SEQUENCE AS SUBMITTED ON THE PROJECT SHOP DRAWINGS. LABELS TO BE SIMILAR TO "BROTHER P-TOUCH" BLACK LETTERING ON WHITE BACKGROUND, SELF-ADHESIVE TAPE. ALL DEVICE LABELS WILL BE INSTALLED PRIOR TO SYSTEM CHECKOUT.
19. ALL PENETRATIONS OF WALLS AND FLOORS WILL BE FIRE STOPPED IN ACCORDANCE WITH THE ASTM AND NFPA. REFER TO RELATED SPECIFICATION SECTIONS FOR ADDITIONAL INFORMATION. INSTALLATION OF FIRE-STOPS SHALL BE PERFORMED BY AN APPLICATOR/INSTALLER QUALIFIED AND TRAINED BY THE MANUFACTURER. INSTALLATION WILL BE PERFORMED IN STRICT ACCORDANCE WITH MANUFACTURER'S DETAILED INSTALLATION PROCEDURES.
20. REFER TO SPECIFICATION SECTIONS 280500 AND 283111 AS WELL AS ALL RELATED SPECIFICATION SECTION FOR PROJECT SUBMITTAL REQUIREMENTS AND ADDITIONAL INFORMATION.
21. ALL EQUIPMENT ENCLOSURES LOCATED OUTSIDE OR IN ALL AREAS WITH HIGH MOISTURE OR A RELATIVE HUMIDITY OF 75% OR GREATER WILL BE NEMA 4X ENCLOSURES RATED FOR THAT APPLICATION.
22. ALL EQUIPMENT EXPOSED TO THE ENVIRONMENT OR INSTALLED IN PROXIMITY TO AREAS WITH HIGH MOISTURE, OR A RELATIVE HUMIDITY OF 75% OR GREATER WILL BE PROVIDED WITH ENCLOSURES AND OR BACKBOXES RATED FOR THE ENVIRONMENTAL CONDITIONS.
23. THE STROBE INTENSITY OF ALL VISUAL NOTIFICATION APPLIANCES WILL BE IN ACCORDANCE WITH NFPA 72 AND UL 1971. STROBE CANDELA RATINGS WILL BE PROVIDED IN ACCORDANCE WITH DEVICE LOCATIONS AND WILL CONFORM TO ALL ICC/ANSI 117 AND NFPA 72 INSTALLATION REQUIREMENTS. CONTRACTOR WILL PROVIDE THE REQUIRED CANDELA POWER AND LOCATE ALL VISUAL NOTIFICATION APPLIANCES AS REQUIRED TO MEET THE REQUIREMENTS OF ALL REFERENCED CODES AND STANDARDS.
24. THE FIRE ALARM CONTRACTOR SHALL FURNISH AND INSTALL A SIEMONS FC2025 DESIGO FIRE CONTROL PANEL WITH RELEASING MODULE XC120001-U1 AS THE LINEAR HEAT DECTECTOR FOR THE FIRE SUPPRESSION DELUGE SYSTEM LOCATED ON THE APRON SIDE OF THE NEW CONCOURSE.. THE FA CONTRACTOR SHALL COORDINATE WITH THE FIRE PROTECTION (SUPPRESSION) CONTRACTOR FOR CONNECTIVITY REQUIREMENTS.
25. THE FA CONTRACTOR SHALL FURNISH AND INSTALL THE JUCTION BOX TO HOUSE THE STRAIN RELEIF CONNECTOR AND THE END OF LINE RESISTOR.
26. THE FA CONTRACTOR SHALL FURNISH AND INSTALL THE HEAT DETECTOR CABLE FOR THE ENITRE LENGTH OF THE BUILDING FOR THE DELUGE SYSTEM.

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Revisions

No.	Date	Description

Project No.:	Project Number
Designed By:	AB
Drawn By:	AB
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Drawing Title:

FIRE ALARM - GENERAL NOTES

BID DOCUMENT

Drawing No.:

FA001

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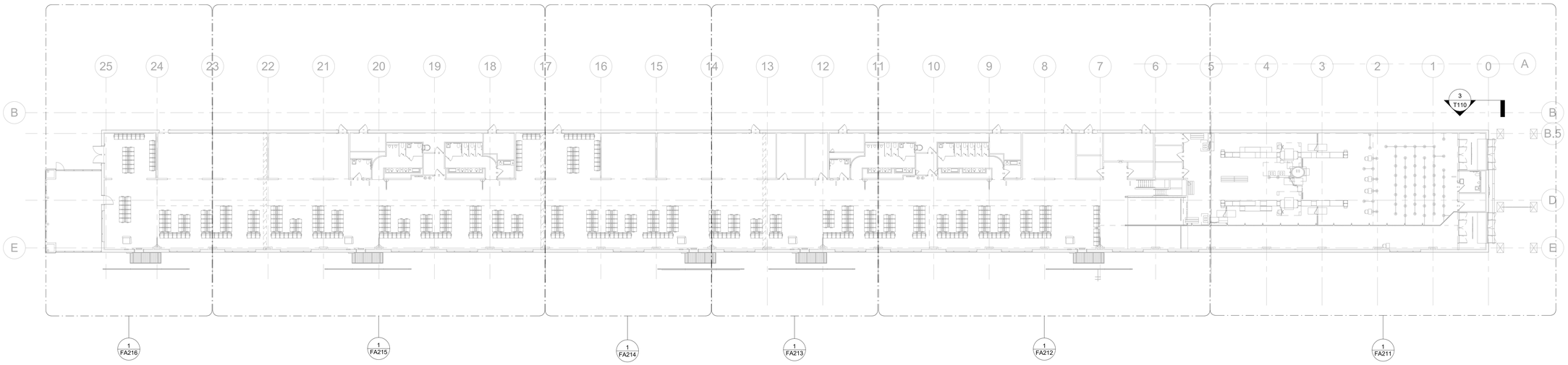

1 Level 1 - Fire Alarm
1" = 20'-0"

FIRE ALARM - ADD ALTERNATE NOTES:

1. FA CONTRACTOR SHALL PRICE WORK FOR ADD ALTERNATES IN AREAS AS CALLED OUT ON ARCHITECTURAL DRAWINGS AND AS DEFINED ON SHEET G211. INCLUDE MATERIALS AND LABOR COST FOR ADD ALTERNATES AS REQUIRED.
2. FA CONTRACTOR SHALL COORDINATE WITH ARCHITECT FOR DELINEATION AND DOCUMENTATION TO INCLUDE ADD ALTERNATES.

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OVERALL FLOOR PLANS

BID DOCUMENT

Drawing No.:

FA110

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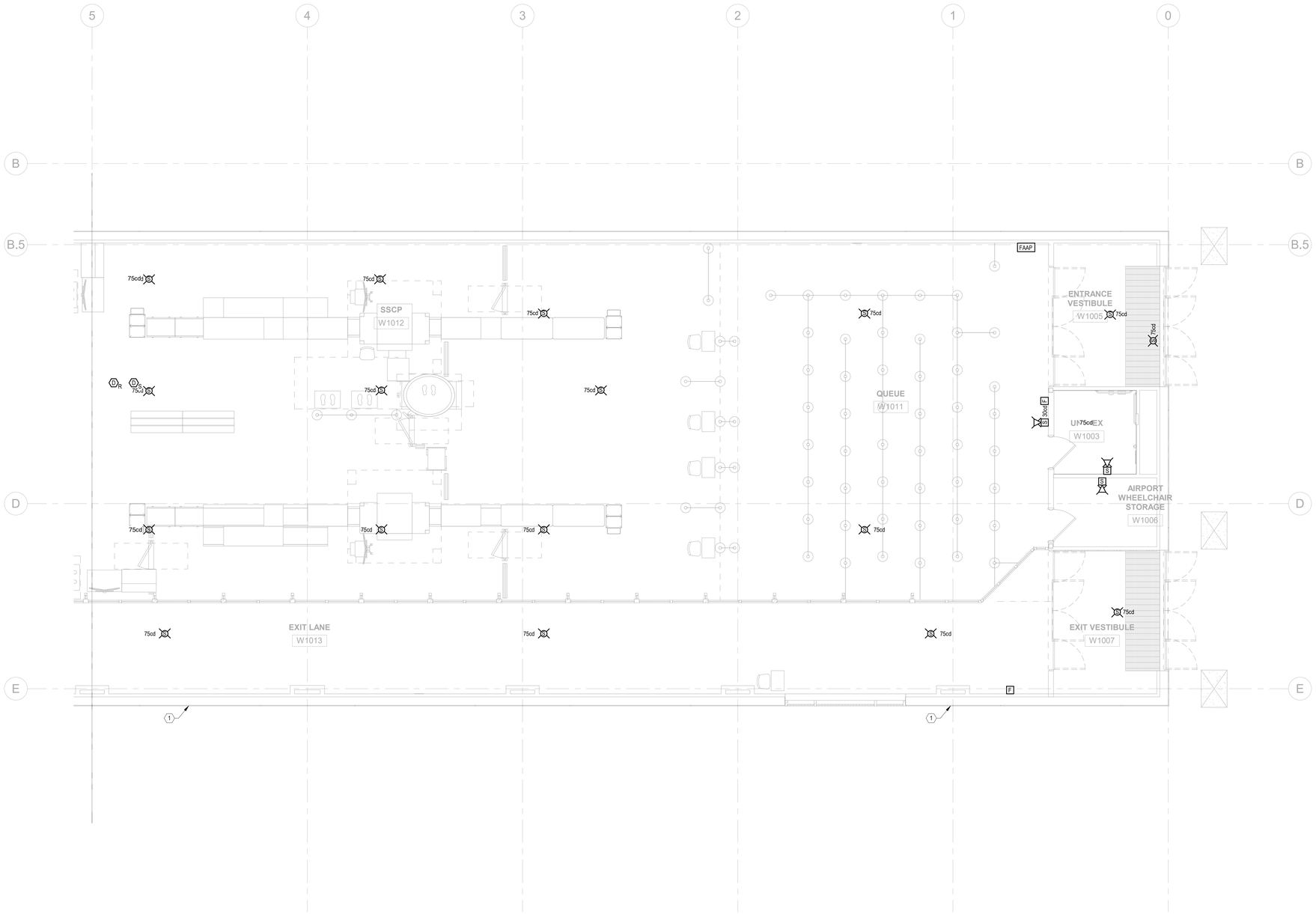

1 LEVEL 1 - FIRE ALARM - AREA 1
3/16" = 1'-0"

GENERAL NOTES:

1. FA CONTRACTOR SHALL PROVIDE ALL PANELS, EQUIPMENT, DEVICES, AND CONNECTIVITY RELATED TO THE FIRE ALARMS SYSTEM.
2. FA CONTRACTOR SHALL COORDINATE WITH THE FIRE SUPPRESSION CONTRACTOR FOR FLOW SWITCH,TAMPERS SWITCH AND SOLENOID DELUGE VALVE CONNECTIVITY.
3. FA CONTRACTOR SHALL FURNISH AND INSTALL LINEAR HEAT DETECTOR CABLE FOR THE DELUGE SYSTEM
4. FA CONTRACTOR SHALL FURNISH ALL DUCT DETECTORS AND COORDINATE PROVIDE TO THE DIVISION 21 CONTRACTOR.
5. CONTRACTOR SHALL FURNISH AND INSTALL LINEAR HEAT DETECTOR CABLE THE LENGTH OF THE BUILDING AS IDENTIFIED IN DRAWINGS.

KEYED NOTES:

CONTRACTOR SHALL FURNISH AND INSTALL:

1. LINEAR HEAT DETECTOR CABLE (LHD). LHD SHALL BE STRAPPED DIRECTLY TO THE DELUGE SPRINKLER PIPE USING MANUFACTURE SUPPORT TIES.
LHD CABLE SHALL BE ONE CONTINUOUS RUN FOR THE ENTIRE LENGTH OF THE BUILDING (APRON SIDE).

FIRE ALARM - ADD ALTERNATE NOTES:

1. FA CONTRACTOR SHALL PRICE WORK FOR ADD ALTERNATES IN AREAS AS CALLED OUT ON ARCHITECTURAL DRAWINGS AND AS DEFINED ON SHEET G211. INCLUDE MATERIALS AND LABOR COST FOR ADD ALTERNATES AS REQUIRED.
2. FA CONTRACTOR SHALL COORDINATE WITH ARCHITECT FOR DELINEATION AND DOCUMENTATION TO INCLUDE ADD ALTERNATES.

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ENLARGED FLOOR PLAN LEVEL 1 - AREA 1

BID DOCUMENT

Drawing No.:

FA211

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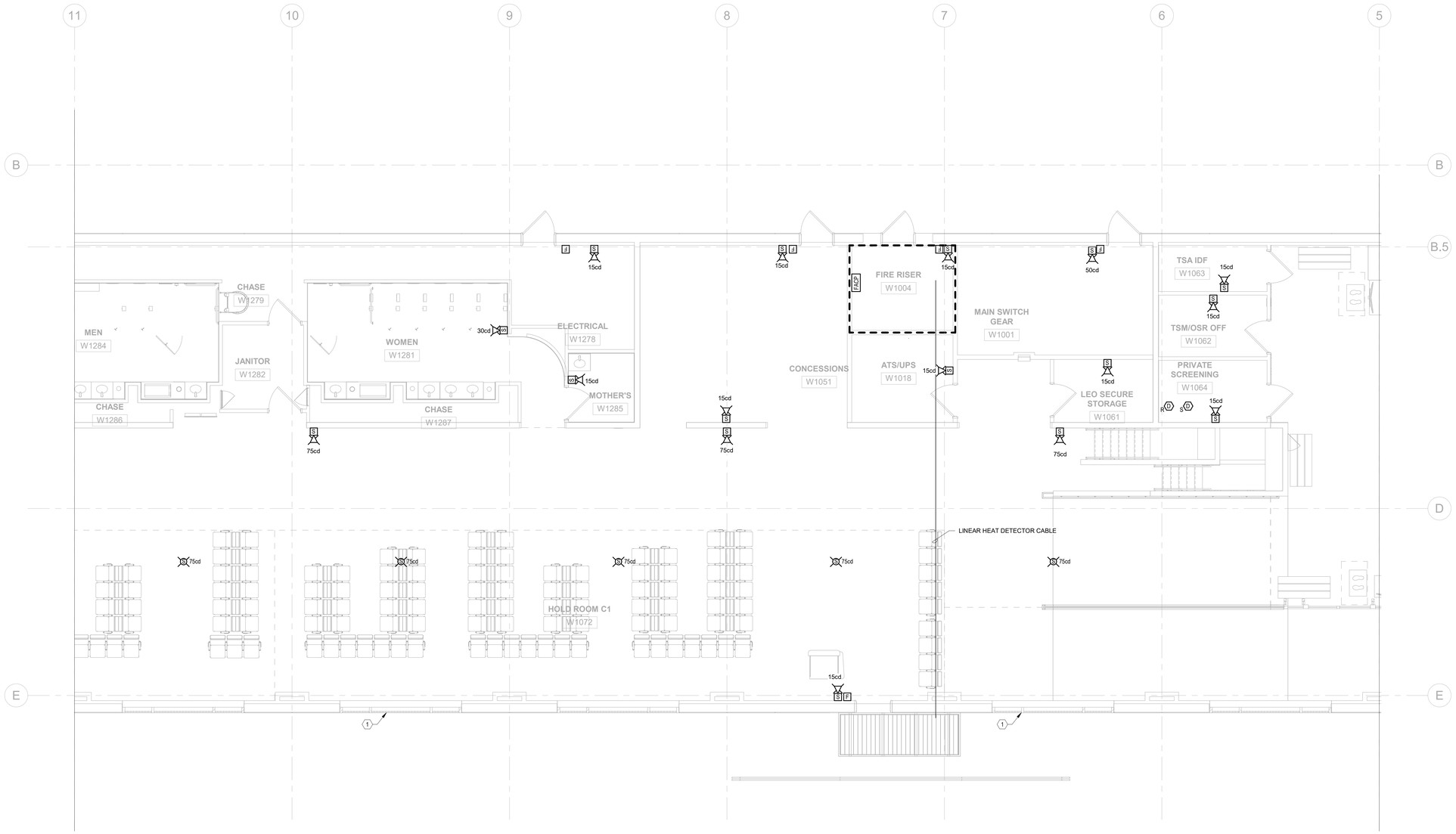

1 LEVEL 1 - FIRE ALARM - AREA 2
3/16" = 1'-0"

GENERAL NOTES:

1. FA CONTRACTOR SHALL PROVIDE ALL PANELS, EQUIPMENT, DEVICES, AND CONNECTIVITY RELATED TO THE FIRE ALARMS SYSTEM.
2. FA CONTRACTOR SHALL COORDINATE WITH THE FIRE SUPPRESSION CONTRACTOR FOR FLOW SWITCH,TAMPERS SWITCH AND SOLENOID DELUGE VALVE CONNECTIVITY.
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4. FA CONTRACTOR SHALL FURNISH ALL DUCT DETECTORS AND COORDINATE PROVIDE TO THE DIVISION 21 CONTRACTOR.
5. CONTRACTOR SHALL FURNISH AND INSTALL LINEAR HEAT DETECTOR CABLE THE LENGTH OF THE BUILDING AS IDENTIFIED IN DRAWINGS.

KEYED NOTES:

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1. LINEAR HEAT DETECTOR CABLE (LHD). LHD SHALL BE STRAPPED DIRECTLY TO THE DELUGE SPRINKLER PIPE USING MANUFACTURE SUPPORT TIES.
LHD CABLE SHALL BE ONE CONTINUOUS RUN FOR THE ENTIRE LENGTH OF THE BUILDING (APRON SIDE).

FIRE ALARM - ADD ALTERNATE NOTES:

1. FA CONTRACTOR SHALL PRICE WORK FOR ADD ALTERNATES IN AREAS AS CALLED OUT ON ARCHITECTURAL DRAWINGS AND AS DEFINED ON SHEET G211. INCLUDE MATERIALS AND LABOR COST FOR ADD ALTERNATES AS REQUIRED.
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ENLARGED FLOOR PLAN LEVEL 1 - AREA 2

BID DOCUMENT

Drawing No.:

FA212

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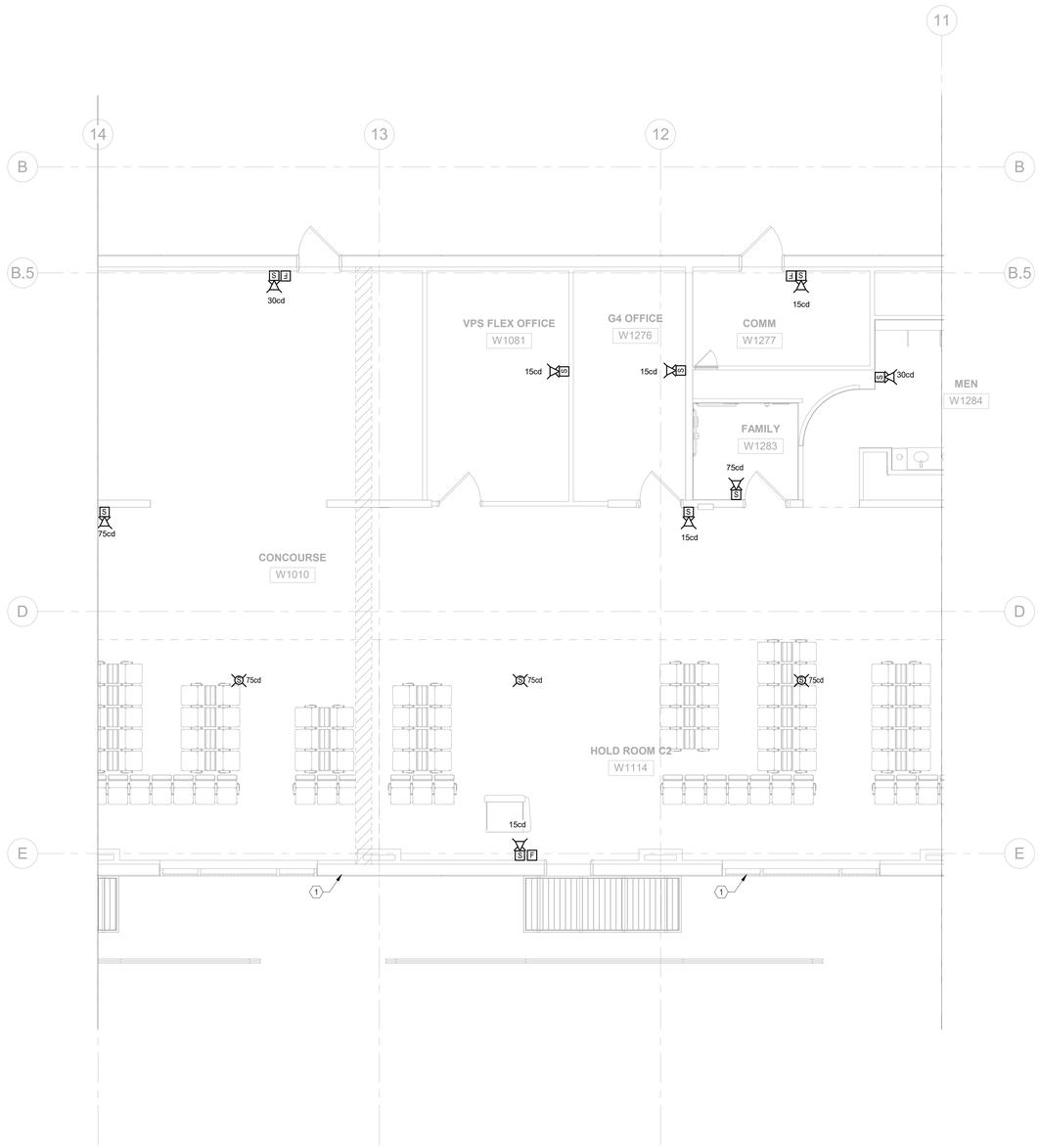

1 LEVEL 1 - FIRE ALARM - AREA 3
3/16" = 1'-0"

GENERAL NOTES:

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FIRE ALARM - ADD ALTERNATE NOTES:

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2. FA CONTRACTOR SHALL COORDINATE WITH ARCHITECT FOR DELINEATION AND DOCUMENTATION TO INCLUDE ADD ALTERNATES.

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ENLARGED FLOOR PLAN LEVEL 1 - AREA 3

BID DOCUMENT

Drawing No.:

FA213

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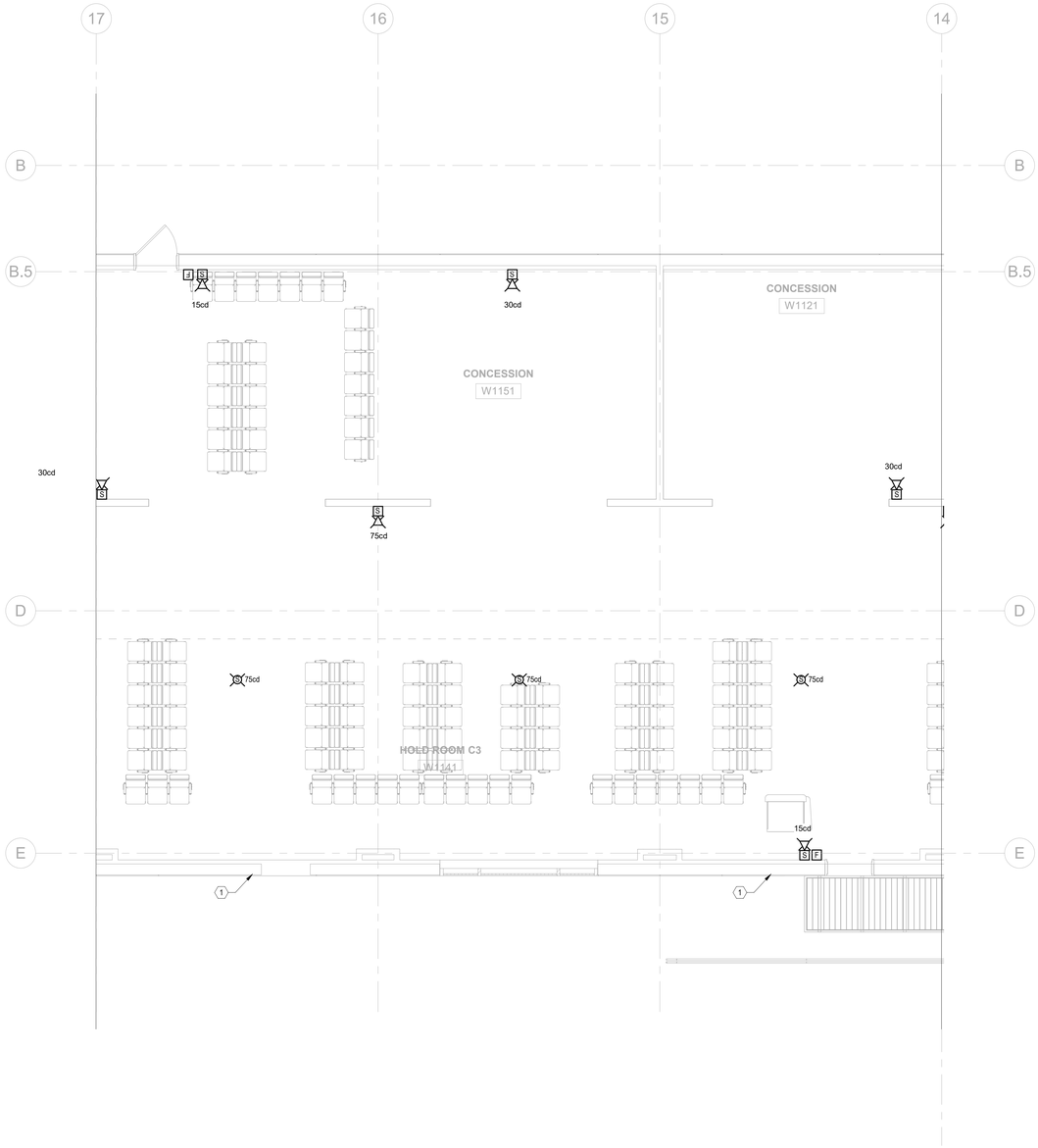

1 LEVEL 1 - FIRE ALARM - AREA 4
3/16" = 1'-0"

GENERAL NOTES:

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KEYED NOTES:

CONTRACTOR SHALL FURNISH AND INSTALL:

1. LINEAR HEAT DETECTOR CABLE (LHD). LHD SHALL BE STRAPPED DIRECTLY TO THE DELUGE SPRINKLER PIPE USING MANUFACTURE SUPPORT TIES.
LHD CABLE SHALL BE ONE CONTINUOUS RUN FOR THE ENTIRE LENGTH OF THE BUILDING (APRON SIDE).

FIRE ALARM - ADD ALTERNATE NOTES:

1. FA CONTRACTOR SHALL PRICE WORK FOR ADD ALTERNATES IN AREAS AS CALLED OUT ON ARCHITECTURAL DRAWINGS AND AS DEFINED ON SHEET G211. INCLUDE MATERIALS AND LABOR COST FOR ADD ALTERNATES AS REQUIRED.
2. FA CONTRACTOR SHALL COORDINATE WITH ARCHITECT FOR DELINEATION AND DOCUMENTATION TO INCLUDE ADD ALTERNATES.

OKALOOSA COUNTY

FLY VPS

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MLM-MARTIN ARCHITECTS, INC.

JOHN E. BURNS
LICENSE
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STATE OF FLORIDA
PROFESSIONAL ENGINEER

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Revisions

No.	Date	Description

Project No.:	**Project Number**
Designed By:	**Designer**
Drawn By:	**AB**
Checked By:	**JB**
Issue Date:	**30-NOV-2020**
Drawing Scale:	

Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 4

BID DOCUMENT

Drawing No.:

FA214

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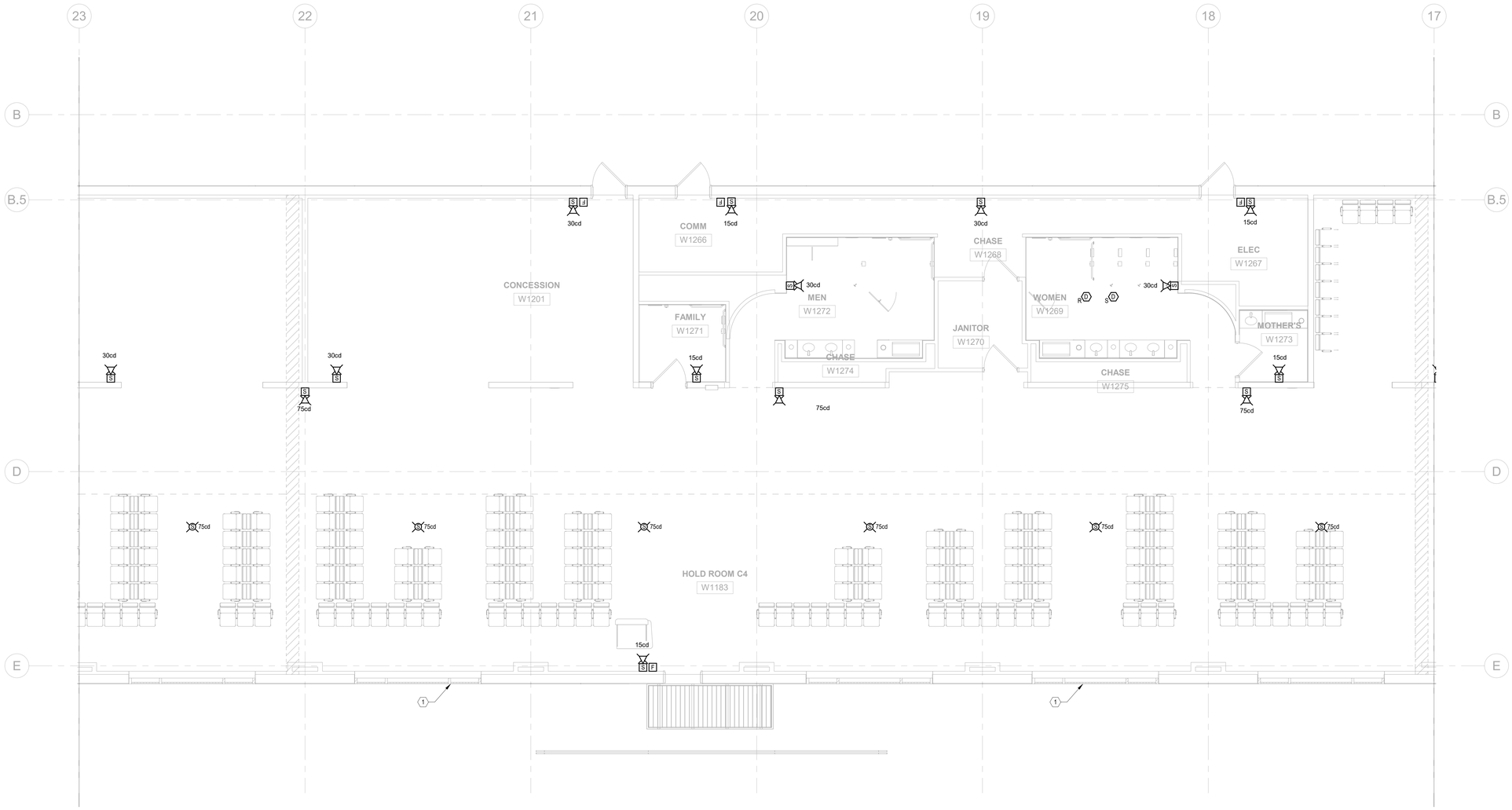

1 LEVEL 1 - FIRE ALARM - AREA 5
3/16" = 1'-0"

GENERAL NOTES:

1. FA CONTRACTOR SHALL PROVIDE ALL PANELS, EQUIPMENT, DEVICES, AND CONNECTIVITY RELATED TO THE FIRE ALARMS SYSTEM.
2. FA CONTRACTOR SHALL COORDINATE WITH THE FIRE SUPPRESSION CONTRACTOR FOR FLOW SWITCH,TAMPERS SWITCH AND SOLENOID DELUGE VALVE CONNECTIVITY.
3. FA CONTRACTOR SHALL FURNISH AND INSTALL LINEAR HEAT DETECTOR CABLE FOR THE DELUGE SYSTEM
4. FA CONTRACTOR SHALL FURNISH ALL DUCT DETECTORS AND COORDINATE PROVIDE TO THE DIVISION 21 CONTRACTOR.
5. CONTRACTOR SHALL FURNISH AND INSTALL LINEAR HEAT DETECTOR CABLE THE LENGTH OF THE BUILDING AS IDENTIFIED IN DRAWINGS.

KEYED NOTES:

CONTRACTOR SHALL FURNISH AND INSTALL:

1. LINEAR HEAT DETECTOR CABLE (LHD). LHD SHALL BE STRAPPED DIRECTLY TO THE DELUGE SPRINKLER PIPE USING MANUFACTURE SUPPORT TIES.
LHD CABLE SHALL BE ONE CONTINUOUS RUN FOR THE ENTIRE LENGTH OF THE BUILDING (APRON SIDE).

FIRE ALARM - ADD ALTERNATE NOTES:

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OKALOOSA COUNTY

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Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 5

BID DOCUMENT

Drawing No.:

FA215

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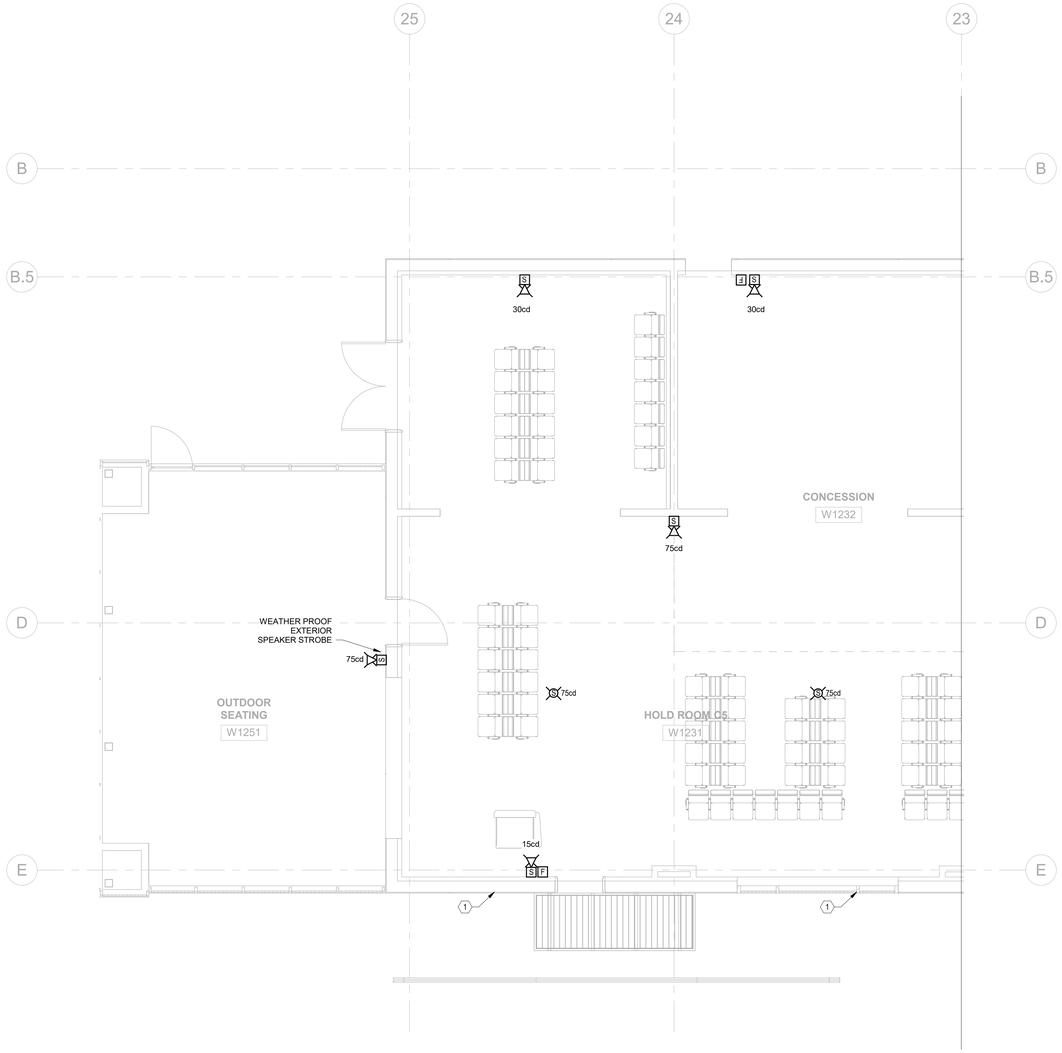

1 LEVEL 1 - FIRE ALARM - AREA 6
3/16" = 1'-0"

GENERAL NOTES:

1. FA CONTRACTOR SHALL PROVIDE ALL PANELS, EQUIPMENT, DEVICES, AND CONNECTIVITY RELATED TO THE FIRE ALARMS SYSTEM.
2. FA CONTRACTOR SHALL COORDINATE WITH THE FIRE SUPPRESSION CONTRACTOR FOR FLOW SWITCH,TAMPERS SWITCH AND SOLENOID DELUGE VALVE CONNECTIVITY.
3. FA CONTRACTOR SHALL FURNISH AND INSTALL LINEAR HEAT DETECTOR CABLE FOR THE DELUGE SYSTEM
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KEYED NOTES:

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FIRE ALARM - ADD ALTERNATE NOTES:

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ENLARGED FLOOR PLAN LEVEL 1 - AREA 6

BID DOCUMENT

Drawing No.:

FA216

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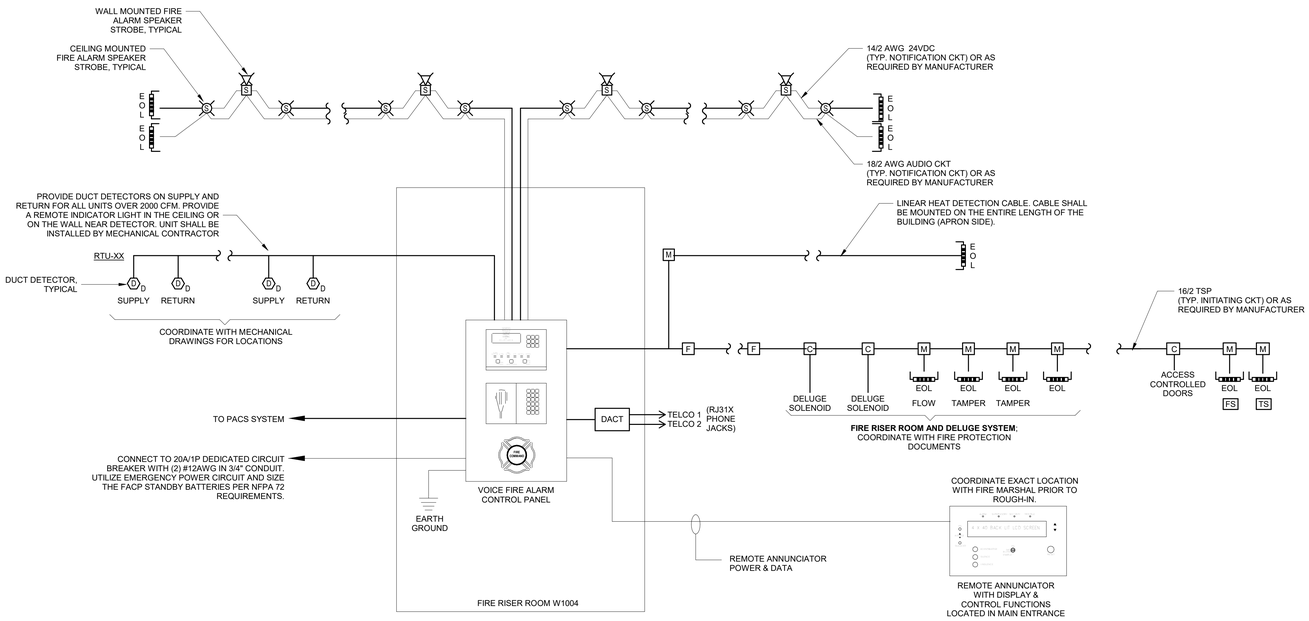

FIRE ALARM SYSTEM RISER NOTES:

1. THIS RISER DIAGRAM IS BASED ON SIEMENS BUILDING TECHNOLOGIES DESIGO VOICE FIRE ALARM CONTROL PANEL. THIS DIAGRAM IS DIAGRAMMATIC ONLY AND DOES NOT REPRESENT ACTUAL DEVICE QUANTITIES UNLESS OTHERWISE NOTED. IT IS A REPRESENTATION OF THE INTENDED SYSTEM FOR THIS PROJECT. SEE THE FLOOR PLANS FOR EXACT QUANTITIES AND LOCATIONS OF FIELD EQUIPMENT. SEE THE PROJECT SPECIFICATIONS FOR PERFORMANCE AND COMPLIANCE REQUIREMENTS. QUANTITY AND SIZE OF CONDUCTORS TO BE DETERMINED BY SIEMENS.
2. THE SYSTEM SHALL BE UL LISTED FOR FIRE [UL864] AND MASS NOTIFICATION [UL2572] IN ONE (1) FIRE ALARM CONTROL PANEL (FACP). IT SHALL ALSO SUPPORT GAS ALARM EVENTS FOR CO DETECTION, PER NFPA 72.
3. THE SYSTEM SHALL HAVE THE CAPACITY TO NETWORK UP TO 32 FIRE AND VOICE PANELS UTILIZING VOICE-OVER-IP (VOIP) TECHNOLOGY. ALL FIRE AND VOICE SIGNALS SENT OVER THE SAME CONDUCTORS. PEER-TO-PEER NETWORKED PANELS SHALL HAVE THE CAPABILITY OF DISPLAYING LOCAL OR GLOBAL EVENTS. THE NETWORK SHALL ALSO SUPPORT THE ABILITY TO INTERFACE WITH A UL LISTED DESKTOP WORKSTATION.
4. PROVIDE AUXILIARY FIRE ALARM SIGNAL PANEL(S) AND VOICE AMPLIFIERS W/ BATTERY BACKUP AS REQUIRED TO SUPPORT NOTIFICATION APPLIANCE LOADS. THE SYSTEM SHALL HAVE THE CAPABILITY TO SUPPORT A THREE-CHANNEL MESSAGE PLAYER WITH UP TO 300 MESSAGES.
5. PROVIDE A MANUAL VOICE PAGING SWITCHES FOR 'ALL CALL' FOR SIMULTANEOUSLY PAGING THE ENTIRE FACILITY AND SELECTIVE PAGING FOR EACH FLOOR AND FIRE AREA.
6. ALL WIRING REQUIREMENTS SHALL BE AS PER MANUFACTURER'S RECOMMENDATIONS.
7. PROVIDE END OF LINE RESISTERS AS NECESSARY.
8. ALL ADDRESSABLE SLC'S SHALL BE NFPA 72 CLASS B, STYLE 4.
9. ALL NOTIFICATION NAC'S SHALL BE NFPA 72 CLASS B, STYLE Y.
10. STROBE CANDELAS MUST BE SIZED PER NFPA 72 REQUIREMENTS BY THE FIRE ALARM VENDOR AND SHOWN ON THE SHOP DRAWINGS.
11. ALL PANEL BATTERY BACKUP (STANDBY & ALARM) SHALL BE SIZED PER NFPA 72 REQUIREMENTS.
12. A COMPLETE SET FOR FIRE ALARM PRODUCT CUTSHEETS, FIRE ALARM SHOP DRAWINGS, AND BATTERY/ VOLTAGE/ LOAD CALCULATIONS MUST BE SUBMITTED AND APPROVED PRIOR TO INSTALLATION.
13. PRIMARY FACP POWER FED VIA BRANCH CIRCUIT(S) DEDICATED FOR THE FIRE ALARM SYSTEM.
14. ALL EARTH GROUND PANEL CONNECTIONS REQUIRED BY THE MANUFACTURER SHALL BE CONNECTED TO THE BUILDING'S GROUND. PANEL NEUTRAL OR GROUNDING TO CONDUIT/ BUILDING STEEL NOT ACCEPTABLE.
15. FOR EXTERIOR BUILDING MOUNTED LINEAR HEATER DETECTORS, CONTRACTOR SHALL INSTALL SYSTEMS AS RECOMMENDED BY THE FIRE ALARM MANUFACTURER. INCLUDE ALL SYSTEM REQUIREMENTS INCLUDING POWER, CONDUIT AND WIRING FOR A FULLY FUNCTIONING SYSTEM TO ACTIVATE THE EXTERIOR BUILDING MOUNTED DELUGE SYSTEM. COORDINATE WITH FIRE PROTECTION DOCUMENTS FOR ADDITIONAL INSTALLATION REQUIREMENTS.

FIRE ALARM SYSTEM MATRIX

DEVICE RESPONSE	SMOKE	HEAT	DUCT SMK	PULL	LINEAR HEAT DETECTOR	SPRINKLER
ANNUNCIATION AT FACP			■	■		■
ANNUNCIATION AT FAAP			■	■		■
TRANSMIT ALARM TO CENTRAL MONITORING STATION			■	■		■
TRANSMIT SUPERVISORY ALARM TO CENTRAL MONITORING STATION			■	■		■
ACTIVATION NOTIFICATION APPLIANCES				■		■
RELEASE ELECTRONICALLY CONTROLLED DOORS				■		■
DELUGE RELEASE VALVE					■	

1 FA RISER DIAGRAM
NONE

FIRE ALARM - ADD ALTERNATE NOTES:

1. FA CONTRACTOR SHALL PRICE WORK FOR ADD ALTERNATES IN AREAS AS CALLED OUT ON ARCHITECTURAL DRAWINGS AND AS DEFINED ON SHEET G211. INCLUDE MATERIALS AND LABOR COST FOR ADD ALTERNATES AS REQUIRED.
2. FA CONTRACTOR SHALL COORDINATE WITH ARCHITECT FOR DELINEATION AND DOCUMENTATION TO INCLUDE ADD ALTERNATES.

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Revisions

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Drawing Title:

SINGLE LINE DIAGRAM - FIRE ALARM

BID DOCUMENT

Drawing No.:

FA511

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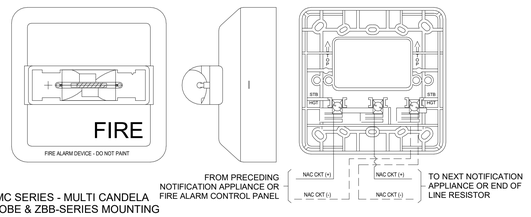
NOTES:
1. STROBES CAN BE SYNCHRONIZED USING THE SIEMENS DSC SYNC MODULE OR WITH THE BUILT-IN SYNC PROTOCOL IN SIEMENS PANELS AND POWER SUPPLIES.
2. FIELD SELECTABLE CANDELA.
3. Z SERIES DEVICES TO BE MOUNTED ON THE ZBB BACK PLATE. REMOVE DUST COVER BEFORE DEVICE INSTALLATION.
4. WHEN TERMINATING FIELD WIRES, DO NOT USE MORE LEAD LENGTH THAN REQUIRED. EXCESS LEAD LENGTH COULD RESULT IN INSUFFICIENT SPACE FOR THE APPLIANCE.
5. REFER TO THE APPLICABLE NFPA CODE AND FIELD DEVICE INSTALLATION FOR CORRECT MOUNTING HEIGTHS.
6. THE Z SERIES UNIVERSAL MOUNTING BACK PLATE CAN BE MOUNTED TO A SINGLE GANG, DOUBLE GANG, 4" SQUARE, 3 1/2" AND 4" OCTAGON ELECTRICAL BOX.
7. SEE INSTALLATION SHEET FOR ADDITIONAL INFORMATION ON MOUNTING AND CONNECTION OPTIONS.



1 ZR-MC SERIES - MULTI CANDELA STROBE & ZBB-SERIES MOUNTING PLATE
12" = 1'-0"

NOTES:
1. STROBES CAN BE SYNCHRONIZED USING THE SIEMENS DSC SYNC MODULE OR WITH THE BUILT-IN SYNC PROTOCOL IN SIEMENS PANELS AND POWER SUPPLIES.
2. FIELD SELECTABLE CANDELA, HORN TYPE AND dBA SETTING.
3. Z SERIES DEVICES TO BE MOUNTED ON THE ZBB BACK PLATE. REMOVE DUST COVER BEFORE DEVICE INSTALLATION.
4. WHEN TERMINATING FIELD WIRES, DO NOT USE MORE LEAD LENGTH THAN REQUIRED. EXCESS LEAD LENGTH COULD RESULT IN INSUFFICIENT SPACE FOR THE APPLIANCE.
5. REFER TO THE APPLICABLE NFPA CODE AND FIELD DEVICE INSTALLATION FOR CORRECT MOUNTING HEIGTHS.
6. THE Z SERIES UNIVERSAL MOUNTING BACK PLATE CAN BE MOUNTED TO A SINGLE GANG, DOUBLE GANG, 4" SQUARE, 3 1/2" AND 4" OCTAGON ELECTRICAL BOX.
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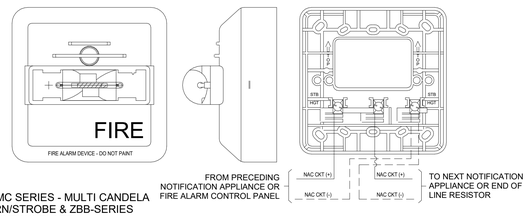
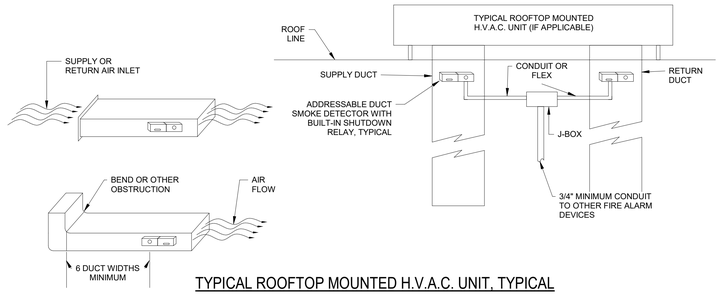
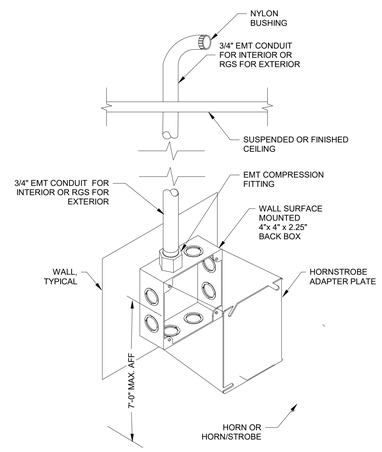


2 ZH-MC SERIES - MULTI CANDELA HORN/STROBE & ZBB-SERIES MOUNTING PLATE
12" = 1'-0"

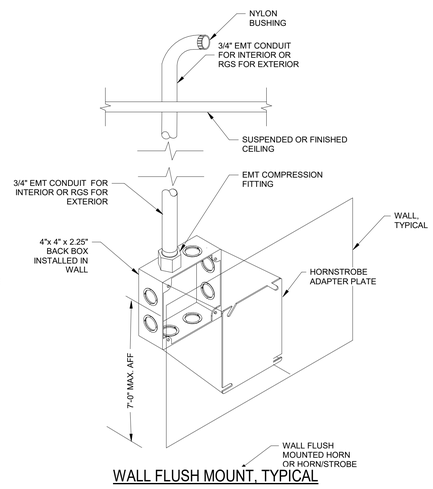


TYPICAL ROOFTOP MOUNTED H.V.A.C. UNIT, TYPICAL

3 FIRE ALARM DUCT SMOKE DETECTOR INSTALLATION DETAILS
NONE



WALL SURFACE MOUNT, TYPICAL



WALL FLUSH MOUNT, TYPICAL

NOTE:
1. TYPICAL STROBE OR HORN/STROBE SHALL USE MANUFACTURER BACBOX FOR ALL DEVICES UNLESS FLUSH MOUNTED.
2. HORN/STROBE SHALL BE WHEELOCK MODEL ET70WP-2475W-FR OR LATEST MODEL.
3. STROBE SHALL BE WHEELOCK MODEL RSS-24MCC-FW & RSS-24MCC-FR OR LATEST MODEL.

4 FIRE ALARM PULL STATION INSTALLATION DETAILS
NONE

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DETAILS - FIRE DEVICE INSTALLATION

BID DOCUMENT

Drawing No.:

FA810

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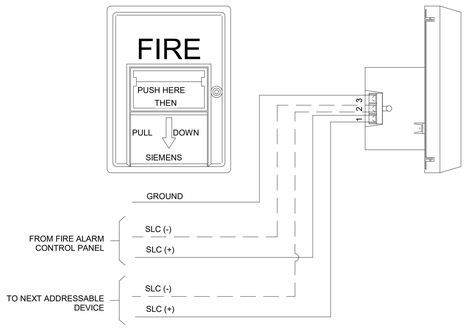
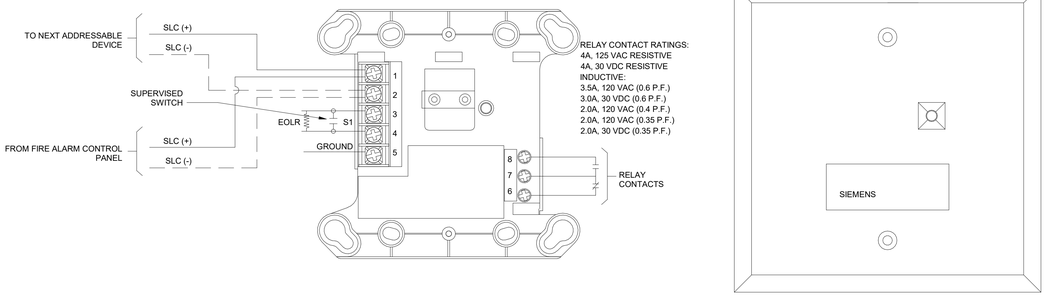
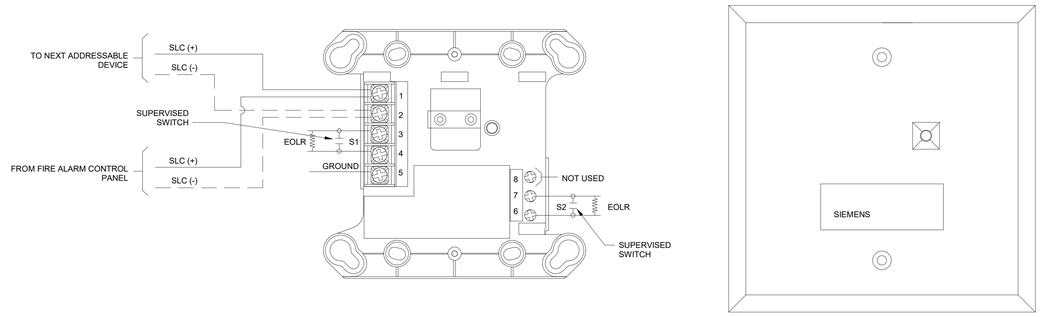


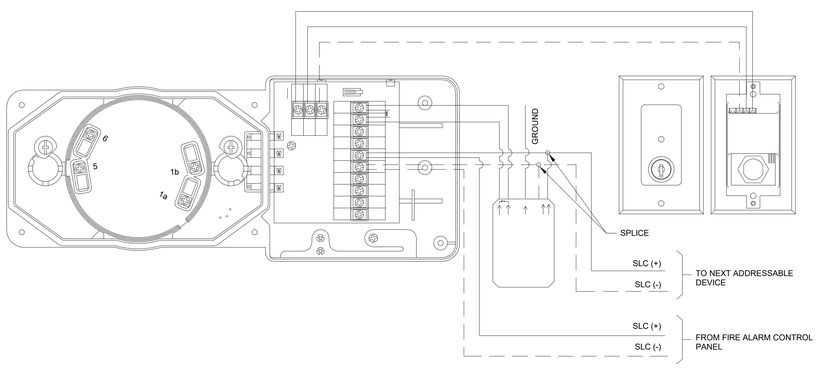
HMS - DUAL ACTION MANUAL PULL STATION



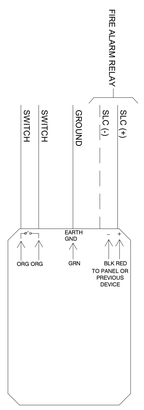
HTRI-R - RELAY MODULE



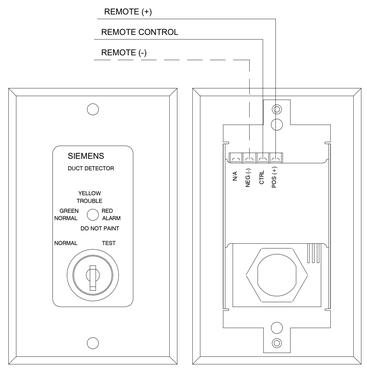
HTRI-D - MONITOR MODULE



FDBZ492-HR - AIR DUCT HOUSING WITH A FDBZ-RTL TEST SWITCH MODULE AND A HTRI-MINI MONITOR MODULE



HTRI-M - MINI MONITOR MODULE



FDBZ-RTL - TEST SWITCH MODULE

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DETAILS - FIRE ALARM WIRING

BID DOCUMENT

Drawing No.:

FA811

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MOUNTING HEIGHTS

CEILING	SMOKE AND HEAT DETECTORS, 360° SECURITY MOTION DETECTORS, CCTV SURVEILLANCE CAMERAS, PUBLIC ADDRESS AND VOICE EVACUATION SPEAKERS, WIRELESS ACCESS POINTS. TV AND LCD PROJECTOR JACKS
8' A.F.G.	EXTERIOR VISUAL AND AUDIO/VISUAL FIRE ALARM NOTIFICATION DEVICES, EXTERIOR PUBLIC ADDRESS SPEAKERS.
7'-5" A.F.F.	CLOCKS, COMBINATION CLOCK/SPEAKERS, TRUMPET SPEAKERS
7'-0" A.F.F.	VISUAL AND AUDIO/VISUAL FIRE ALARM NOTIFICATION DEVICES, WALL MOUNTED SECURITY MOTION DETECTORS (CENTER OF DEVICE)
6" ABOVE DOOR JAMB	REQUEST TO EXIT MOTION DETECTORS
5'-6" A.F.F	TOP OF PLYWOOD TELEPHONE BACKBOARD
5'-4" A.F.F.	FIRE ALARM ANNUNCIATOR PANELS, FIRE FIGHTER CONTROL STATIONS, SECURITY ANNUNCIATOR PANELS, VISUAL DISPLAYS, TACTILE DISPLAYS
4'-8" A.F.G. MAX	PEDESTAL MOUNT INTERCOM PEDESTAL MOUNT CARD READER
4'-0" A.F.F.	"PS" TELEPHONE OUTLETS (TOP OF COIN SLOT),(WALL MOUNTED)-TELEPHONE INSTRUMENTS, INTERCOM STATIONS, FIRE FIGHTER TELEPHONE JACKS, FIRE ALARM MANUAL STATIONS, CARD READERS, MANUAL REQUEST TO EXIT DEVICES, WALL MOUNTED DURESS ALARM STATIONS, RESCUE ASSISTANCE PANELS, LCD KEYPADS (CENTER OF DEVICE)
UNDER COUNTER OR DESK	DURESS ALARM BUTTONS, DOOR RELEASE BUTTOMS
1'-6" A.F.F.	DATA/TELEPHONE JACKS, LOW TELEVISION JACKS, MICROPHONE JACKS
0'-0"	IN FLOOR JUNCTION BOXES FLUSH TO FINISHED FLOOR (FF) (DATA, TELEPHONE, MICROPHONE, MEDIA)

1. IN MASONRY CONSTRUCTION THE MOUNTING HEIGHTS SHALL BE USED FOR REFERENCE TO THE NEAREST BLOCK OR BRICK COURSING.
2. THE ABOVE MOUNTING ELEVATIONS ARE TO CENTER OF DEVICE AND SHALL BE ADHERED TO UNLESS SPECIFICALLY NOTED OR DETAILED OTHERWISE ON THE DRAWINGS AND/OR SPECIFICATIONS.
3. COORDINATE THE INSTALLATION AND MOUNTING ELEVATIONS OF ALL EQUIPMENT, DEVICES, CONTROLS AND APPURTENANCES WITH ARCHITECT AND ALL AFFECTED TRADES PRIOR TO INSTALLATION. DOCUMENT ALL MOUNTING ELEVATIONS FOR ALL EQUIPMENT, DEVICES, CONTROLS AND APPURTENANCES AT THE TIME OF SHOP DRAWING SUBMITTAL

TELECOMMUNICATION ABBREVIATIONS

A/AMP	AMPERE	KVA	KILOVOLT AMPERE
AC	ALTERNATING CURRENT	KVAR	KILOVAR (REACTANCE)
ACC	ACCENT	KW	KILOWATT
ACR	ATTENUATION/CROSSTALK RATIO	KWH	KILOWATT HOUR METER
ADJ	ADJUSTABLE	LA	LIGHTNING ARRESTER
AFF	ABOVE FINISHED FLOOR	LED	LIGHT EMITTING DIODE
AFG	ABOVE FINISHED GRADE	LT	LIGHT
AL	ALUMINUM	LTG	LIGHTING
AM	AMMETER	LV	LOW VOLTAGE
APPROX	APPROXIMATELE(LY)	MATV	MASTER ANTENNA TELEVISION
ASY	ASYMETRIC	MC	MECHANICAL CONTRACTOR
ATS	AUTOMATIC TRANSFER SWITCH	MCB	MAIN CIRCUIT BREAKER
AWG	AMERICAN WIRE GAUGE	MCC	METAL-CLAD CABLE
BATT	BATTERY	MCC	MOTOR CONTROL CENTER
BFC	BELOW FINISHED CEILING	MCP	MOTOR CIRCUIT PROTECTOR
BKR	BREAKER	MDP	MAIN DISTRIBUTION PANEL
BLDG	BUILDING	MFR	MANUFACTURER
BLK	BLACK	MH	MANHOLE
BRKT	BRACKET	MH	METAL HALIDE
C	CONDUIT	MISC	MISCELLANEOUS
CAB	CABINET	MLO	MAIN LUGS ONLY
CATV	CABLE TELEVISION	MM	MILLIMETER
CB	CIRCUIT BREAKER	MOD	MOTOR OPERATED DAMPER
CCTV	CLOSED CIRCUIT TELEVISION	MTD	MOUNTED
cd	CANDELA	MTG HT	MOUNTING HEIGHT
CIR/CKT	CIRCUIT	MTS	MANUAL TRANSFER SWITCH
CLF	CURRENT LIMITING FUSE	MUFIDS	MULTI-USER FLIGHT INFORMATION DISPLAY
CLG	CEILING	MV	MILLIVOLT
CLR	CLEAR	MV	MEDIUM VOLTAGE
COL	COLUMN	N/A	NOT AVAILABLE/NOT APPLICABLE
COMM	COMMUNICATION	NEC	NATIONAL ELECTRIC CODE
CT	CURRENT TRANSFORMER	NEMA	NATIONAL ELECTRIC MFR ASSOCIATION
CU	COPPER	NEXT	NEAR END CROSSTALK
CW	COOL WHITE	NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
DAS	DISTRIBUTED ANTENNA SYSTEM	NIC	NOT IN CONTRACT
dB	DECIBEL	NL	NIGHT LIGHT
DC	DIRECT CURRENT	NO	NORMALLY OPENED
DE	DUAL ELEMENT	NTS	NOT TO SCALE
DED	DEDICATED	OC	ON CENTER
DIA	DIAMETER	OH	OVERHEAD
DISC	DISCONNECT	OL	OVERLOAD HEATER ELEMENT
DNLT	DOWNLIGHT	P	POLE
DP	DISTRIBUTION PANEL	PB	PULL BOX
DPDT	DOUBLE POLE DOUBLE-THROW	PEW	PEWTER
DWG	DRAWING	PLY	PLYWOOD
EA	EACH	PNL	PANEL
EC	ELECTRICAL CONTRACTOR	PP	POWER PANEL
EF	EXHAUST FAN	PT	POTENTIAL TRANSFORMER
EIA	ELECTRONICS INDUSTRY ASSOCIATION	PVC	POLYVINYL CHORIDE
ELEC	ELECTRICAL	RECPT	RECEPTACLE
ELEV	ELEVATOR	REFL	REFLECTOR
EMERG	EMERGENCY	REQ	REQUIRED
EO	ELECTRICALLY OPERATED	RGS	RIGID GALVANIZED STEEL CONDUIT
EQIP	EQUIPMENT	RIO	ROUGH IN ONLY
ESB	ENERGY SAVING BALLAST	RM	ROOM
EVIDS	ELECTRONIC VIDEO INFORMATION DISPLAY SYSTEM	RS	RAPID START
EWC	ELECTRIC WATER COOLER	SCH	SCHEDULE
FA	FIRE ALARM	SPDT	SINGLE POLE SINGLE THROW
FAA	FIRE ALARM ANNUNCIATOR	SPST	SINGLE POLE DOUBLE THROW
FAAP	FIRE ALARM ANNUNCIATOR PANEL	SSB	SOLID STATE BALLAST
FACP	FIRE ALARM CONTROL PANEL	SW	SWITCH
FAGP	FIRE ALARM GRAPHIC ANNUNCIATOR PANEL	SWBD	SWITCHBOARD
FEXT	FAR END CROSSTALK	SWGR	SWITCHGEAR
FIXT	FIXTURE	TELE	TELEPHONE
FL	FLOOR	TIA	TELECOMMUNICATIONS INDUSTRY ASSOCIATION
FLA	FULL LOAD AMPERES	TSB	TECHNICAL SERVICE BULLETIN
FLOUR	FLUORESCENT	TSP	TWISTED SHIELDED PAIR
FT	FOOTCANDLES	TT	TWIN TUBE
FVNR	FULL VOLTAGE NON-REVERSING	TYP	TYPICAL
GC	GENERAL CONTRACTOR	UL	UNDERWRITER'S LABORATORIES
GEN	GENERATOR	UON	UNLESS OTHERWISE NOTED
GFI	GROUND FAULT INTERRUPTER	UPS	UNINTERRUPTABLE POWER SUPPLY
GND/G	GROUND	UTP	UNSHIELDED TWISTED PAIR
HH	HAND HOLE	V	VOLT
HID	HIGH INTENSITY DISCHARGE	VM	VOLTMETER
HP	HORSEPOWER	VP	VAPOR PROOF
HPF	HIGH POWER FACTOR	W	WATT
HV	HIGH VOLTAGE	W/	WITH
HVAC	HEATING VENTILATING AIR CONDITIONING	W/I	WITHIN
HZ	HERTZ	W/O	WITHOUT
IG	ISOLATED GROUND	WAP	WIRELESS ACCESS POINT
INCAN	INCANDESCENT	WP	WEATHERPROOF
IPS	INVERTER POWER SUPPLY	WW	WARM WHITE
JB	JUNCTION BOX	XFMR	TRANSFORMER
		XP	EXPLOSION PROOF

GENERAL COMMUNICATIONS SYSTEM NOTES:

1. THE FOLLOWING GENERAL NOTES AS LISTED BELOW SHALL APPLY TO ALL COMMUNICATIONS SYSTEM REQUIREMENTS AS INDICATED ON ALL T - SERIES CONTRACT DRAWINGS.
2. DRAWINGS FOR THIS WORK ARE DIAGRAMMATIC AND INTENDED TO CONVEY THE EXTENT, GENERAL ARRANGEMENT AND LOCATIONS OF THE WORK. BECAUSE OF THE SCALE OF THE DRAWINGS, CERTAIN BASIC ITEMS SUCH AS ACCESS PANELS, CONDUITS, CABINET SIZES, PENETRATION SLEEVES, PULL BOXES, BACKBOXES AND JUNCTION BOXES MAY NOT BE SHOWN. INCLUDE ALL ITEMS WHERE REQUIRED BY CODE, MANUFACTURER AND RELATED SPECIFICATION SECTIONS FOR THE PROPER INSTALLATION OF ALL WORK.
3. DUE TO SCALE OF THE DRAWINGS, ALL COMMUNICATIONS DEVICE SYMBOLS ARE SHOWN ON DRAWINGS AS CLOSE AS POSSIBLE TO THEIR INTENDED LOCATION. CONTRACTOR SHALL COORDINATE IN THE FIELD THE PROPER INSTALLATION OF ALL EQUIPMENT, DEVICES, CONTROLS AND CABLING. REFER TO RELATED SPECIFICATION SECTIONS FOR ADDITIONAL REQUIREMENTS.
4. COORDINATE WITH ALL TRADES AND SYSTEM INTEGRATORS ANY CONDITIONS RELATED TO THE INSTALLATION OF ALL SYSTEMS. THE CONTRACTOR SHALL COORDINATE WITH THE APPROPRIATE TRADE ALL INSTALLATION REQUIREMENTS IMPACTING THE PLACEMENT OF ALL SYSTEM COMPONENTS TO THE SATISFACTION OF ALL CONCERNED TRADES.
5. COORDINATE EXACT LOCATION OF ALL DESK, FURNITURE OR COUNTER MOUNTED EQUIPMENT WITH OWNER AND ARCHITECT AND ALL AFFECTED TRADES PRIOR TO THE INSTALLATION OF ANY EQUIPMENT AND/OR CABLING.
6. COORDINATE EXACT LOCATION(S) OF ALL CEILING MOUNTED CABLE, CONDUITS, EQUIPMENT AND/OR DEVICES WITH ALL ARCHITECTURAL PLANS, REFLECTED CEILING PLANS AND ALL AFFECTED TRADES PRIOR TO INSTALLATION.
7. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL EQUIPMENT, DEVICES, CONNECTIVITY, SOFTWARE LICENSING, SOFTWARE UPGRADES, MOUNTING BRACKETS, SUPPORTS AND APPURTENANCES AND ADHERE TO MANUFACTURER INSTALLATION REQUIREMENTS IN THE CONTRACT DRAWINGS AND WRITTEN SPECIFICATIONS UNLESS OTHERWISE NOTED.
8. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING EXACT LOCATION(S) OF ALL DATA, TELEPHONE AND A/V OUTLETS, ELECTRICAL RECEPTACLES AND EQUIPMENT WITH ALL ARCHITECTURAL PLANS, FURNITURE PLANS AND ALL AFFECTED TRADES PRIOR TO INSTALLATION. FAILURE TO PROPERLY COORDINATE PRIOR TO INSTALLATION SHALL RESULT IN THE CONTRACTOR PROVIDING ALL MODIFICATIONS AT NO ADDITIONAL COSTS TO THE PROJECT.
9. ALL HORIZONTAL CATEGORY 6 UTP CABLE SHALL BE PLENUM RATED CABLE AND SHALL BE BUNDLED AND ROUTED THROUGH THE FACILITY AND SHALL TERMINATE AT THE NEAREST MDF/IDF EQUIPMENT RACKS. ALL HORIZONTAL CABLE BUNDLES SHALL NOT CONTAIN ANY AC CONDUCTING CABLING. ALL HORIZONTAL CABLE DROPS SHALL NOT EXCEED 294' FROM PATCH PANEL TO OUTLET TERMINATION AND SHALL BE TESTED AND CERTIFIED IN ACCORDANCE WITH ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS. REFER TO RELATED SPECIFICATIONS SECTIONS FOR ADDITIONAL INFORMATION.
10. ALL FIBER OPTIC BACKBONE CABLING SHALL BE ROUTED THROUGH THE FACILITY VIA DEDICATED CONDUITS AND VERTICAL PIPE CHASES INSTALLED WITH PROTECTIVE INNERDUCT CONDUIT SYSTEM AND SHALL TERMINATE AT ALL APPROPRIATE MDF/IDF EQUIPMENT RACKS. THE CONTRACTOR SHALL COORDINATE ALL EQUIPMENT, RACK SPACE REQUIREMENTS, WITH THE OWNER APPROPRIATE SYSTEM INTEGRATORS AND ARCHITECT. ALL FIBER OPTIC CABLING SHALL BE TESTED AND CERTIFIED IN ACCORDANCE WITH ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS. REFER TO RELATED SPECIFICATIONS SECTIONS FOR ADDITIONAL INFORMATION.
11. ALL CONDUITS SHALL BE SIZED AND INSTALLED IN ACCORDANCE WITH NFPA 70 AND PROJECT SPECIFICATIONS. ALL CONDUITS SHALL BE A MINIMUM OF 3/4" UNLESS OTHERWISE NOTED.
12. ALL SYSTEM WIRING, CONDUITS AND EQUIPMENT INSTALLATION SHALL BE IN ACCORDANCE WITH GOOD ENGINEERING PRACTICES AND BY ALL IEEE, ANSI/TIA, NEC AND MANUFACTURER'S REQUIREMENTS. ALL WIRING SHALL COMPLY WITH ALL STATE AND LOCAL ELECTRICAL CODES AND SHALL TEST FREE FROM ALL GROUNDS, SHORTS, STRAY VOLTAGES AND EMI.
13. PROVIDE ALL EQUIPMENT CLEARANCES IN ACCORDANCE WITH NEC REQUIREMENTS. ARRANGE EQUIPMENT TO FACILITATE UNRESTRICTED ACCESS FOR MAINTENANCE AND SERVICE AROUND ALL EQUIPMENT, COMPONENTS AND/OR CABLE TERMINATIONS.
14. PROPERLY GROUND AND BOND ALL EQUIPMENT, RACKS, CABINET'S, CONDUITS AND CABLE SHIELDS IN ACCORDANCE WITH ALL REQUIREMENTS OF THE NFPA 70, ANSI/TIA- 607-C AND EQUIPMENT MANUFACTURER. ALL EQUIPMENT AND COMMUNICATIONS CIRCUITS SHALL BE PROPERLY SURGE PROTECTED AND GROUNDED TO MINIMIZE DAMAGE DUE TO LIGHTNING STRIKES, SNEAK CURRENTS AND OTHER TRANSIENT VOLTAGE SPIKES. ALL SURGE PROTECTION AND GROUNDING SHALL BE IN ACCORDANCE WITH ALL REQUIREMENTS OF THE EQUIPMENT MANUFACTURER, NEC, IEEE AND ANSI/TIA.
15. WHERE EQUIPMENT AND/OR JUNCTION BOXES ARE INSTALLED ABOVE FINISHED CEILINGS, THE CONTRACTOR SHALL PROVIDE ACCESS HATCHES LISTED FOR THE INTENDED APPLICATION. ACCESS HATCHES SHALL BE LOCATED SO THAT SERVICE ACCESS TO THE EQUIPMENT AND/OR JUNCTION BOXES IS UNIMPEDED.
16. ALL PENETRATIONS OF WALLS AND/OR FLOORS SHALL BE FIRE STOPPED IN ACCORDANCE WITH THE ASTM AND NFPA REQUIREMENTS. REFER TO RELATED SPECIFICATION SECTIONS FOR ADDITIONAL INFORMATION. INSTALLATION OF FIRE-STOPS SHALL BE PERFORMED BY AN APPLICATOR/INSTALLER QUALIFIED AND TRAINED BY THE MANUFACTURER. INSTALLATION SHALL BE PERFORMED IN STRICT ACCORDANCE WITH MANUFACTURER'S DETAILED INSTALLATION PROCEDURES.
17. PROVIDE THE PROPER INTERFACES TO BUILDING FIRE ALARM, INTRUSION ALARM AND BUILDING AUTOMATION SYSTEMS IN ACCORDANCE WITH ALL APPLICABLE LIFE SAFETY CODES AND MANUFACTURER IN ACCORDANCE WITH THE CONTRACT DOCUMENTS. COORDINATE WITH THE FIRE ALARM SYSTEM PROVIDER FOR ALL REQUIRED SYSTEM INTEGRATION REQUIREMENTS.
18. ALL EQUIPMENT ENCLOSURES LOCATED OUTSIDE OR IN ALL AREAS WITH HIGH MOISTURE OR A RELATIVE HUMIDITY OF 75% OR GREATER SHALL BE NEMA 4X STAINLESS STEEL AND RATED FOR THAT APPLICATION.
19. ALL DEVICES, COMPONENTS OR EQUIPMENT INSTALLED ON THE EXTERIOR OF THE FACILITY SHALL BE PROVIDED IN ACCORDANCE WITH ALL MANUFACTURERS' REQUIREMENTS TO ENSURE THE PROPER OPERATION WHEN EXPOSED TO THE ENVIRONMENTAL CONDITIONS AND/OR AVERAGE ANNUAL LOWEST TEMPERATURE THAT CAN BE ANTICIPATED FOR THE GEOGRAPHIC REGION OF THE FACILITY.
20. ALL INTERIOR AND/OR EXTERIOR COMPONENTS, DEVICES OR SYSTEMS EQUIPMENT EXPOSED TO THE GENERAL POPULATION SHALL BE INSTALLED IN SECURED EQUIPMENT ENCLOSURES WITH TAMPER SWITCHES AND INSTALLED IN SUCH A MANNER THAT RESISTS TAMPERING AND/OR REMOVAL WITHOUT THE USE OF SPECIALIZED TOOLS.
21. FOR EQUIPMENT INSTALLATIONS REQUIRING COORDINATION WITH OTHER TRADES THE CONTRACTOR SHALL PROVIDE ALL TEMPLATES, BACKBOXES AND EQUIPMENT ANCHOR BOLTS FOR MOUNTING OR FLUSH MOUNTING PREPARATION, (E.G. PEDESTALS OR OTHER DEVICES REQUIRING MOUNTING ON WALLS, CONCRETE PADS OR OTHER MATERIALS). COORDINATE DELIVERY OF TEMPLATES AND EQUIPMENT WITH ALL AFFECTED CONTRACTORS.
22. ALL COMMUNICATIONS EQUIPMENT MUST HAVE TRANSIENT SURGE PROTECTION TO COMPLY WITH UL AND NFPA 70 REQUIREMENTS. WHERE ANY CIRCUITS LEAVE THE BUILDING, ADDITIONAL TRANSIENT PROTECTION MUST BE PROVIDED FOR EACH CIRCUIT. ALL TRANSIENT PROTECTION DEVICES MUST BE UL LISTED UNDER STANDARD #497B (ISOLATED LOOP PROTECTORS).
23. REFER TO ALL RELATED CONTRACT DRAWINGS AND SPECIFICATIONS FOR ADDITIONAL INFORMATION AND/OR REQUIREMENTS RELATED TO THE INSTALLATION, PROGRAMMING, TESTING, COMMISSIONING AND CERTIFICATION OF ALL COMMUNICATIONS SYSTEMS.

TELECOMMUNICATIONS SYMBOL LEGEND

XX	VOICE OUTLET* SUB TEXT REFERS TO CABLING CONFIGURATIONS REFER TO COMMUNICATIONS DETAIL SHEET
XX	COMBINATION VOICE AND DATA OUTLET* SUB TEXT REFERS TO CABLING CONFIGURATIONS REFER TO COMMUNICATIONS DETAIL SHEET
XX	COMBINATION VOICE AND DATA OUTLET* SUB TEXT REFERS TO CABLING CONFIGURATIONS REFER TO COMMUNICATIONS DETAIL SHEET
XX	FLUSH FLOOR MOUNT DATA OUTLET* SUB TEXT REFERS TO CABLING CONFIGURATIONS REFER TO COMMUNICATIONS DETAIL SHEET
XX	CEILING MOUNT DATA OUTLET SUB TEXT REFERS TO CABLING CONFIGURATIONS REFER TO COMMUNICATIONS DETAIL SHEET
MUFIDS	55" DISPLAY CONTRACTOR SHALL COORDINATE WITH THE ARCHITECTURAL DRAWINGS FOR MOUNTING REQUIREMENTS
AP	WIRELESS ACCESS POINT. W - WALL C - CEILING MOUNT
TMGB	TELECOMMUNICATIONS MAIN GROUNDING BUSBAR
TGB	TELECOMMUNICATIONS GROUNDING BUSBAR
ZE	ZONE ENCLOSURE
&	FULL HEIGHT CABINET
	LADDER RACK

NOTES:

- REFER TO FLOOR PLANS FOR EXACT JACK LOCATION.
- COORDINATE THE INSTALLATION OF ALL DATA COMMUNICATION JACKS WITH THE LOCATION OF CIRCUITS PROVIDED FOR THE PROPER CONNECTION OF ALL COMPUTERS, PRINTERS, COPIERS REFER TO ELECTRICAL POWER DRAWINGS AND FURNITURE PLANS FOR EXACT DEVICE LOCATIONS.
- WIREMOLD RACEWAY AND POWER POLES ARE TO BE PROVIDED BY FURNITURE CONTRACTOR. COORDINATE WITH ELECTRICAL CONTRACTOR AND FURNITURE SYSTEMS PROVIDER FOR ALL INSTALLATION REQUIREMENTS.

THIS IS A STANDARD SYMBOL LIST. ALL SYMBOLS MAY NOT APPEAR ON THIS PROJECT.

TELECOMMUNICATIONS TAG INFORMATION

TYPE	DESCRIPTION	PORT QTY
A1	18" AFF WALL MOUNT, REFER TO ARCHTECTUAL PLANS FOR CEILING MOUNTED DEVICES	1
A2	18" AFF WALL MOUNT	2
A4	18" AFF WALL MOUNT	4
A6	PODIUM	6
WP	WALL PHONE MOUNT 48" AFF	6
D	EVIDS / MUFIDS	2
S2	TSA DATA	2
S6	TSA DATA	6
S12	TSA DATA	12
SC	SECURITY CAMERA CEILING MOUNT	1
SW	SECURITY CAMERA PARAPET WALL MOUNT	1
AP - C	WIRELESS ACCESS POINT CEILING MOUNT	1
AP - W	WIRELESS ACCESS POINT WALL MOUNT	1

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Revisions

No.	Date	Description

Project No.:	Project Number
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TELECOM NOTES, LEGEND AND ABBREVIATIONS

BID DOCUMENT

Drawing No.:

T001

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ITEM	SYSTEM	CONTRACTOR		OWNER		NOTES
		FURNISH	INSTALL	FURNISH	INSTALL	
1.0000	**DIVISION 27: PREMISE DISTRIBUTION SYSTEM (PDS)**					
1.0100	HEADEND AND SOFTWARE	-	-	X	X	EXISTING EQUIPMENT
1.0200	INTEGRATION TO EXISTING SYSTEM	X	X	-	-	
1.0300	INTERFACES	X	X	-	-	
1.0400	NETWORK COMPONENTS	X	X		-	(2) CISCO 12 PORT 3850, INSTALLED IN EXISTING TERMINAL ROOM B127. CONTRACTOR SHALL PROVIDE LAYER 2 SWITCH IN CONCOURSE C IDF W1277, W1266, TSA IDF 1063 AS REQUIRED.
1.0500	BACKBONE CABLE	X	X	-	-	MULTIMODE OM4 FIBER FROM EXISTING TERMINAL MDF B127 TO CONCOURSE C CONTRACTOR SHALL BUDGET: • 2,000' OF 96 STRAND OM4 FIBER • 1,000' OF 24 STRAND OM4 FIBER CONTRACTOR SHALL FURNISH AND INSTALL OM4 FIBER BETWEEN IDF'S.
1.0600	HORIZONTAL CABLE	X	X	-	-	CATEGORY 6 UTP PLENUM RATED CABLE, RG-6 QUAD SHIELDED COAXIAL CABLE
1.0700	FIELD DEVICES	X	X	-	-	CATEGORY 6 KEYSTONE JACKS; DATA FACEPLATES; COAX AND CONNECTORS; FIBER PATCH PANELS, COPPER PATCH PANELS, COUPLER /ADAPTER PLATES, CAT.6 PATCH CORDS, FIBER PATCH CORDS, 110 BLOCKS, 66 BLOCKS, FIBER AND CAT. 6 PATCH CORDS.
2.0000	**DIVISION 27: VOICE OVER IP (VOIP) TELEPHONE SYSTEM**					
2.0100	HEADEND AND SOFTWARE	-	-	X	X	MITEL (EXISTING SYSTEM)
2.0200	INTEGRATION TO EXISTING SYSTEM	-	-	X	X	OWNER SHALL BE RESPONSIBLE FOR PROGRAMMING, VOICEMAIL, EXTENSION MAPPING IN CONCOURSE C.
2.0300	INTERFACES	X	X	-	-	GATEWAYS
2.0400	FIELD DEVICESIPONENTS	-	-	X:	X:	TELEPHONE HANDSETSICATES OVER NEW NETWORK IN CONCOURSE C TO EXISTING TERMINAL
3.0000	**DIVISION 27: WIRELESS LOCAL AREA NETWORK (WLAN) SYSTEM**					
3.0100	HEADEND AND SOFTWARE	-	-	x	x	ARUBA WIFI (EXISTING SYSTEM)
3.0200	INTEGRATION TO EXISTING SYSTEM	-	-	x	x	OWNER SHALL CONFIGURE AND PROGRAM WIRELESS ACCESS POINTS.
3.0300	INTERFACES	X	X	X	X	INTERFACES WILL BE BY OWNER IT UNLESS SPECIFIC INTERFACES ARE IDENTIFIED TO BE BY OTHERS.
3.0400	HORIZONTAL CABLE	-	-	-	-	REFER TO ITEM SECTION 1.0000 PREMISE DISTRIBUTION SYSTEM
3.0500	FIELD DEVICES - WIRELESS ACCESS POINTS	X	X	X	X	CONTRACTOR FURNISHES AND INSTALLS ALL MOUNTS, HOUSINGS, AND ENCLOSURES.
4.0000	**DIVISION 27: MUFIDS**					
4.0100	HEADEND AND SOFTWARE	-	-	X	X	INFAX (EXISTING)
4.0200	INTEGRATION TO EXISTING SYSTEM	X	X	-	-	CONTRACTOR SHALL BE RESPONSIBLE OR CONNECTIVITY, AND PROGRAMMING.
4.0300	INTERFACES	X	X	-	-	INTERFACES BY CONTRACTOR.
4.0700	FIELD DEVICES	X	X			WALL MOUNT BRACKETS, DISPLAYS, DISPLAY DEVICE COMPUTERS, CATEGORY AND HDMI CORDS
5.0000	**DIVISION 27: IPTV / CATV**					
5.0100	HEADEND AND SOFTWARE	-	-	X	X	OWNER SHALL BE RESPONSIBLE FOR CONTRACTING WITH THE LOCAL INTERNET SERVICE PROVIDERS FOR CONTENT AND SERVICES.
5.0200	INTEGRATION	-	-	X	X	OWNER SHALL BE RESPONSIBLE FOR ALL CONNECTIONS TO THE DISPLAYS.
5.0300	INTERFACES	X	X	-	-	BY CONTRACTOR.
5.0400	HORIZONTAL CABLE	-	-	-	-	REFER TO ITEM SECTION 1.0000 PREMISE DISTRIBUTION SYSTEM
5.0500	FIELD DEVICES	X	X			WALL MOUNT BRACKETS, DISPLAYS, DISPLAY DEVICE COMPUTERS, CATEGORY 6 UTP, AND HDMI CORDS

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RESPONSIBILTIY
MATRIX LEGEND

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Drawing No.:

T002

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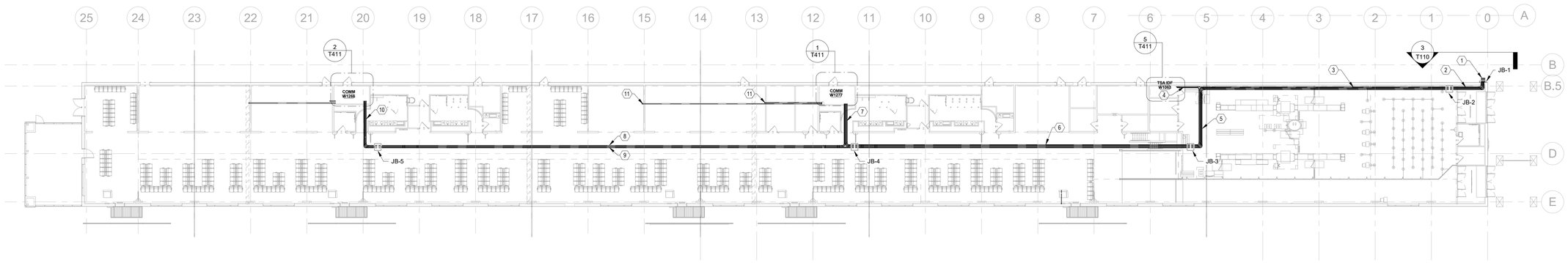
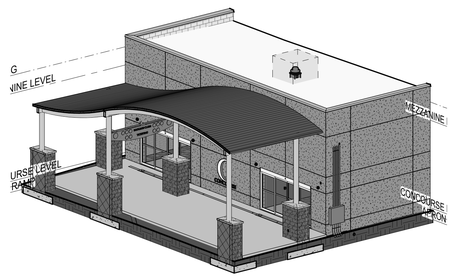
GENERAL NOTES

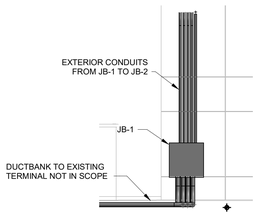
1. ALL OUTLETS AND EQUIPMENT SHOWN ARE DIAGRAMMATICAL IN REFERENCE TO THE FLOOR PLAN. THE DEVICES SHOWN SHALL BE INSTALLED TO REFLECT THE INTENT OF THE DRAWINGS.
2. CONTRACTOR SHALL COORDINATE WITH THE ARCHITECTURAL DRAWINGS FOR MOUNTING OUTLET REQUIREMENTS.
3. COORDINATE WITH ALL OTHER TRADES AND DRAWINGS PRIOR TO INSTALLATION AND PLACEMENT OF WORKSTATION OUTLETS AND EQUIPMENT.



1 Level 1 - Technology
1" = 20'-0"



2 EXTERIOR CONDUITS



3 EXTERIOR CONDUITS
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CONDUIT MATRIX:

KEYED NOTES	QTY.	CONDUIT SIZE	ORIGIN	DESTINATION
1	TBD	4"	CONDUITS FROM EXISTING TERMINAL (NOT IN SCOPE)	JB-1
2	5	2"	JB-1	JB-2
3	1	2"	JB-2	TSA COMM ROOM
4	1	2"	TSA COMM ROOM	JB-3
5	4	2"	JB-2	JB-3
6	5	2"	JB-3	JB-4
7	3	2"	JB-4	COMM ROOM W1277
8	2	2"	COMM ROOM W1277	JB-5
9	2	2"	JB-4	JB-5
10	4	2"	JB-5	COMM ROOM W1266
11	1	4"	COMM ROOM W1277	CONCESSIONS SPACE

CONDUIT NOTES:

1. CONTRACTOR SHALL COORDINATE CONDUIT ROUTING WITH AFFECTED TRADES.
2. CONTRACTOR SHALL FURNISH AND INSTALL ALL CONDUITS, FITTINGS, MOUNTING HARDWARE, SUPPORTS AND APPURTENANCES.
3. CONTRACTOR SHALL INSTALL CONDUIT TO MANUFACTURER INSTALLATION GUIDELINES.

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OVERALL FLOOR PLANS

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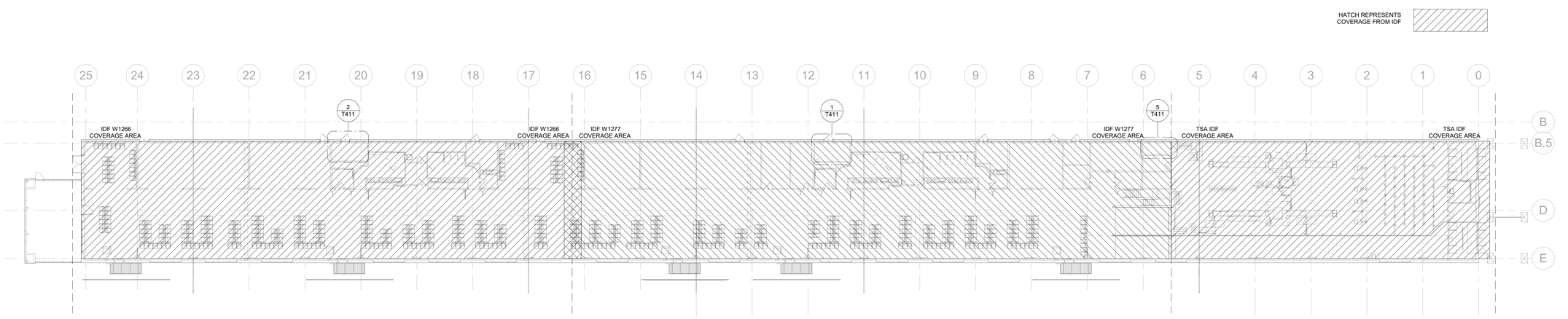
GENERAL NOTES

1. ALL OUTLETS AND EQUIPMENT SHOWN ARE DIAGRAMMATICAL IN REFERENCE TO THE FLOOR PLAN. THE DEVICES SHOWN SHALL BE INSTALLED TO REFLECT THE INTENT OF THE DRAWINGS.
2. CONTRACTOR SHALL COORDINATE WITH THE ARCHITECTURAL DRAWINGS FOR MOUNTING OUTLET REQUIREMENTS.
3. COORDINATE WITH ALL OTHER TRADES AND DRAWINGS PRIOR TO INSTALLATION AND PLACEMENT OF WORKSTATION OUTLETS AND EQUIPMENT.



1 Level 1 - IDF DATA COVERAGE ZONE
1" = 20'-0"

COMMUNICATIONS - ADD ALTERNATE NOTES:

1. COMMUNICATIONS CONTRACTOR SHALL PRICE WORK FOR ADD ALTERNATES IN AREAS AS CALLED OUT ON ARCHITECTURAL DRAWINGS AND AS DEFINED ON SHEET G211. INCLUDE MATERIALS AND LABOR COST FOR ADD ALTERNATES AS REQUIRED.
2. COMMUNICATIONS CONTRACTOR SHALL COORDINATE WITH ARCHITECT FOR DELINEATION AND DOCUMENTATION TO INCLUDE ADD ALTERNATES.

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AA-C002208
MLM JOB # TYPE PROPERTY

JOHN E. BURNS
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STATE OF FLORIDA
PROFESSIONAL ENGINEER

SEAL

Revisions

No.	Date	Description

Project No.:	Project Number
Designed By:	AB
Drawn By:	AB
Checked By:	JB
Issue Date:	30-NOV-2020
Drawing Scale:	As indicated

Drawing Title:

IDF DATA COVERAGE ZONE

BID DOCUMENT

Drawing No.:

T111

BIM 360://Design of Satellite Concourse/VPS_ETSTCFA.rvt

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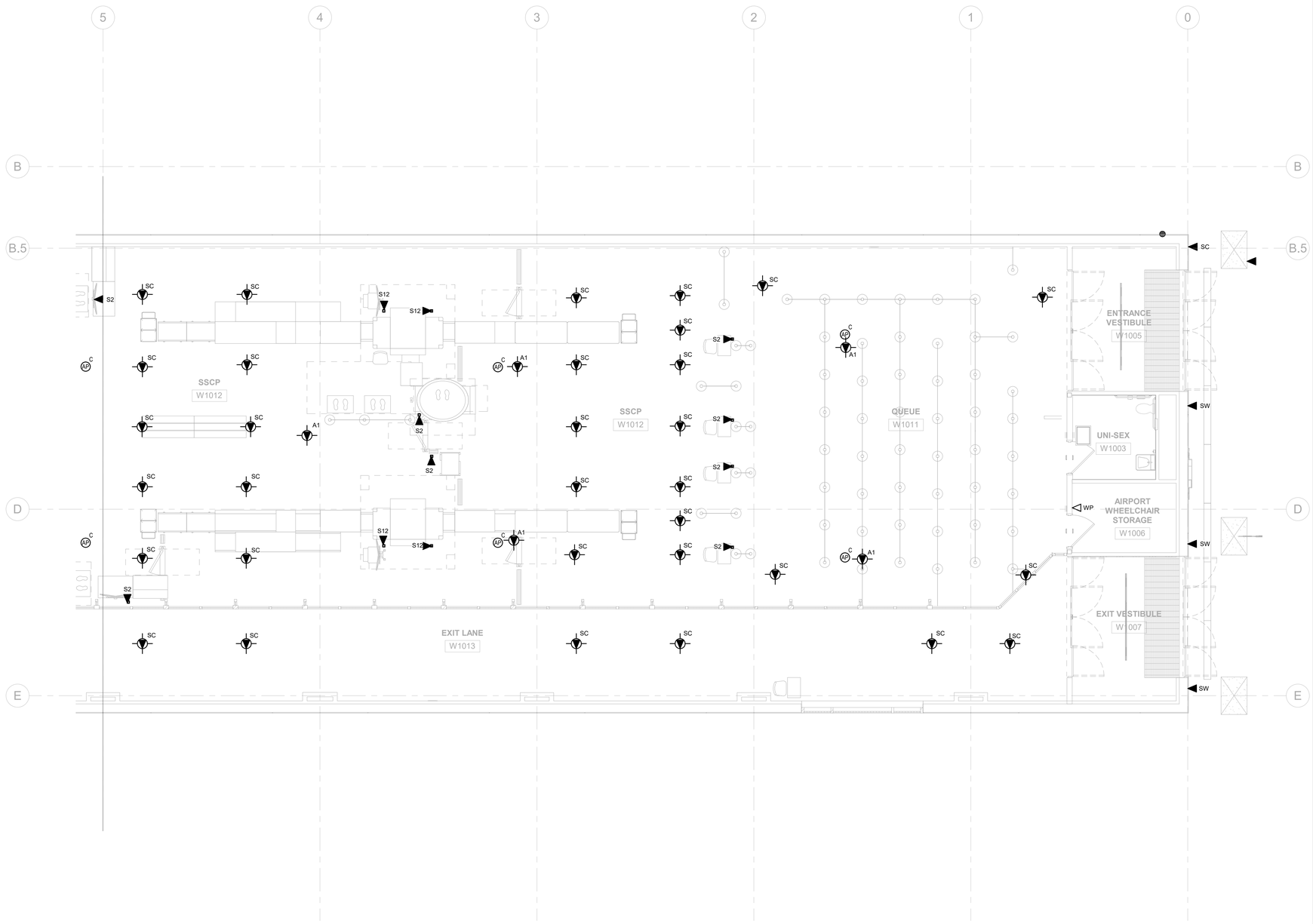

1 LEVEL 1 - TECHNOLOGY - AREA 1
3/16" = 1'-0"

GENERAL NOTES

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3. COORDINATE WITH ALL OTHER TRADES AND DRAWINGS PRIOR TO INSTALLATION AND PLACEMENT OF WORKSTATION OUTLETS AND EQUIPMENT.

NOTES:

1. THE CONTRACTOR SHALL TERMINATE CATEGORY 6 UTP CABLES SERVING TSA EQUIPMENT IN POWER POLES PROVIDED BY THE ELECTRICAL CONTRACTOR.
2. THE CONTRACTOR SHALL COORDINATE WITH THE ELECTRICAL DRAWINGS FOR EXACT POWER POLE LAYOUT.
3. THE CONTRACTOR SHALL TERMINATE TSA CATEGORY 6 CABLES IN THE TSA COMMUNICATIONS IDF. TSA CABLE TYPE ARE AS FOLLOWS:
   - S2
   - S6
   - S12
4. THE CONTRACTOR SHALL PROVIDE ALL CATEGORY 6 PATCHING BETWEEN TSA EQUIPMENT AND IN TSA COMM ROOM W1063. REFER TO TSA CHECK POINT DESIGN GUIDELINE FOR FURTHER INFORMATION.
5. ALL WALL MOUNTED SC SYMBOLS IN THIS AREA SHALLBE MOUNTED TO POWER POLES PROVIDED BY THE ELECTRICAL CONTRACTOR

COMMUNICATIONS - ADD ALTERNATE NOTES:

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OKALOOSA COUNTY

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Checked By:	JB
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Drawing Scale:	

Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 1

BID DOCUMENT

Drawing No.:

T211

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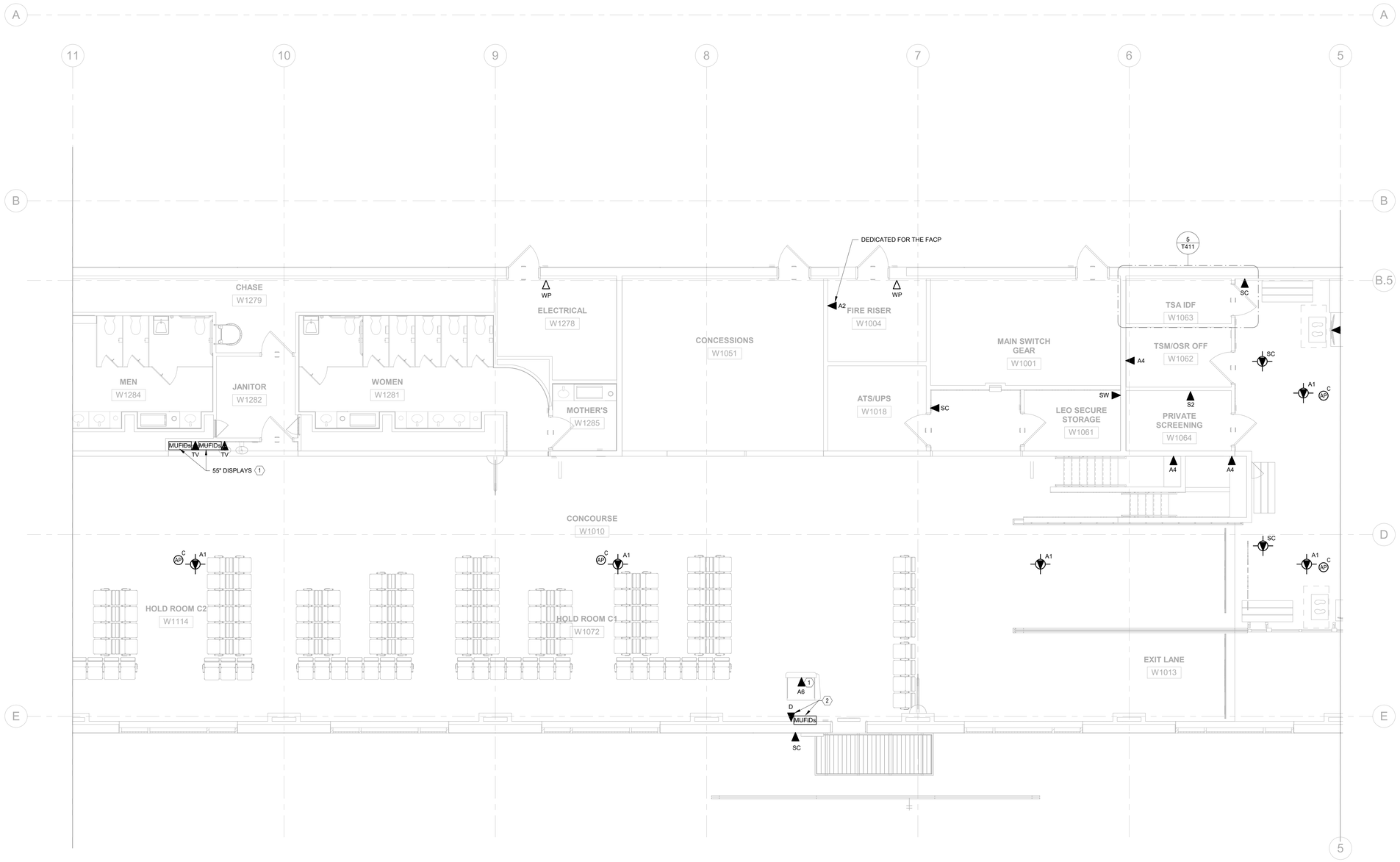

1 LEVEL 1 - TECHNOLOGY - AREA 2
3/16" = 1'-0"

GENERAL NOTES

1. ALL OUTLETS AND EQUIPMENT SHOWN ARE DIAGRAMMATICAL IN REFERENCE TO THE FLOOR PLAN. THE DEVICES SHOWN SHALL BE INSTALLED TO REFLECT THE INTENT OF THE DRAWINGS.
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4. THE CONTRACTOR SHALL PROVIDE ALL CATEGORY 6 PATCHING BETWEEN TSA EQUIPMENT. REFER TO TSA CHECK POINT DESIGN GUIDELINE FOR FURTHER INFORMATION.

KEYED NOTES:

CONTRACTOR SHALL FURNSH AND INSTALL:

1. (1) 1 1/4" EMT FROM THE NEAREST ACCESSIBLE CEILING TO PODIUM. REFER TO DETAILS FOR INSTALLATION REQUIREMENTS.
2. REFER TO ARCHITECTUAL DRAWINGS FOR MOUNTING HEIGHTS.

COMMUNICATIONS - ADD ALTERNATE NOTES:

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Drawing Scale:	

Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 2

BID DOCUMENT

Drawing No.:

T212

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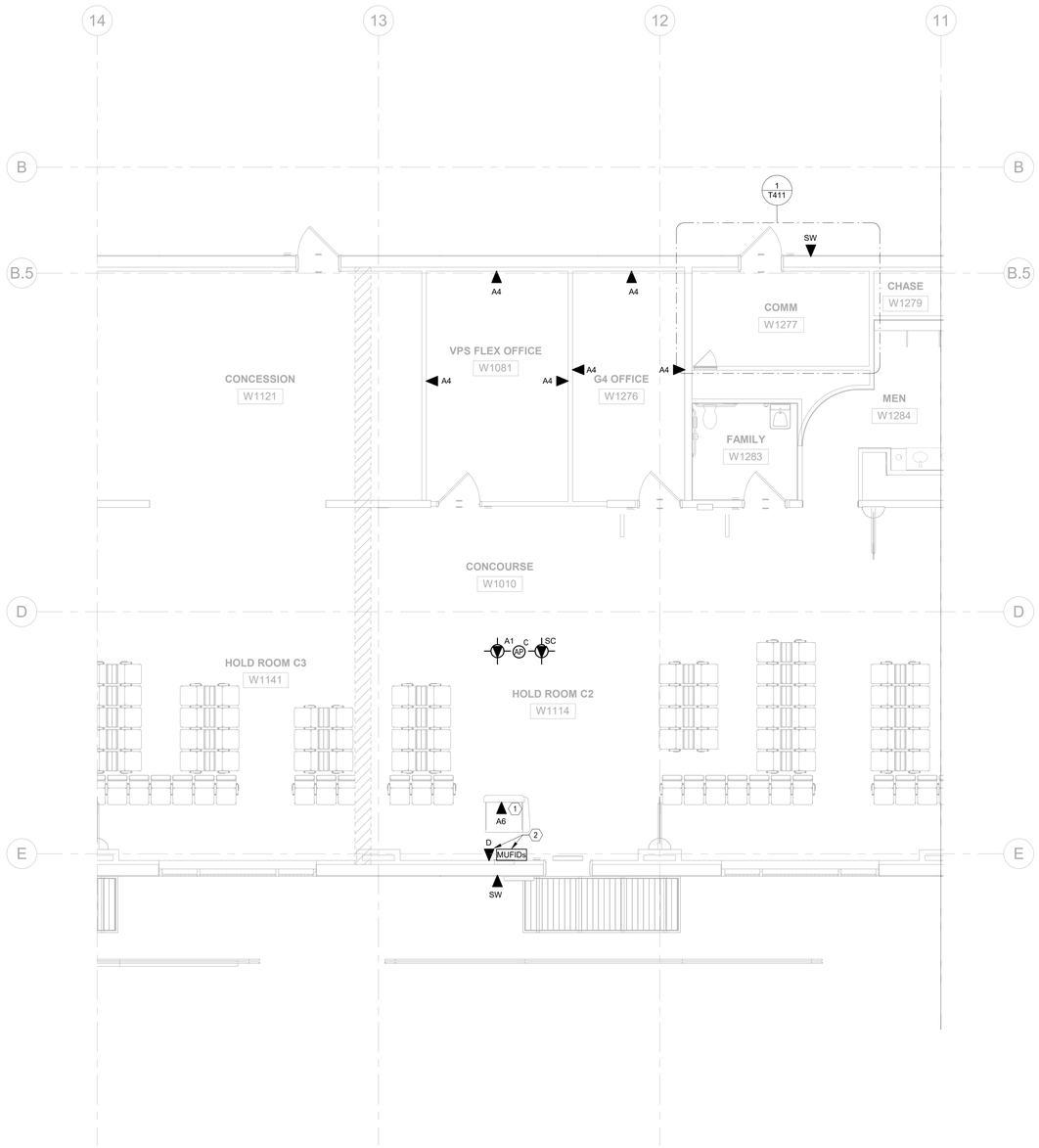

1 LEVEL 1 - TECHNOLOGY - AREA 3
3/16" = 1'-0"

GENERAL NOTES

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ENLARGED FLOOR PLAN LEVEL 1 - AREA 3

BID DOCUMENT

Drawing No.:

T213

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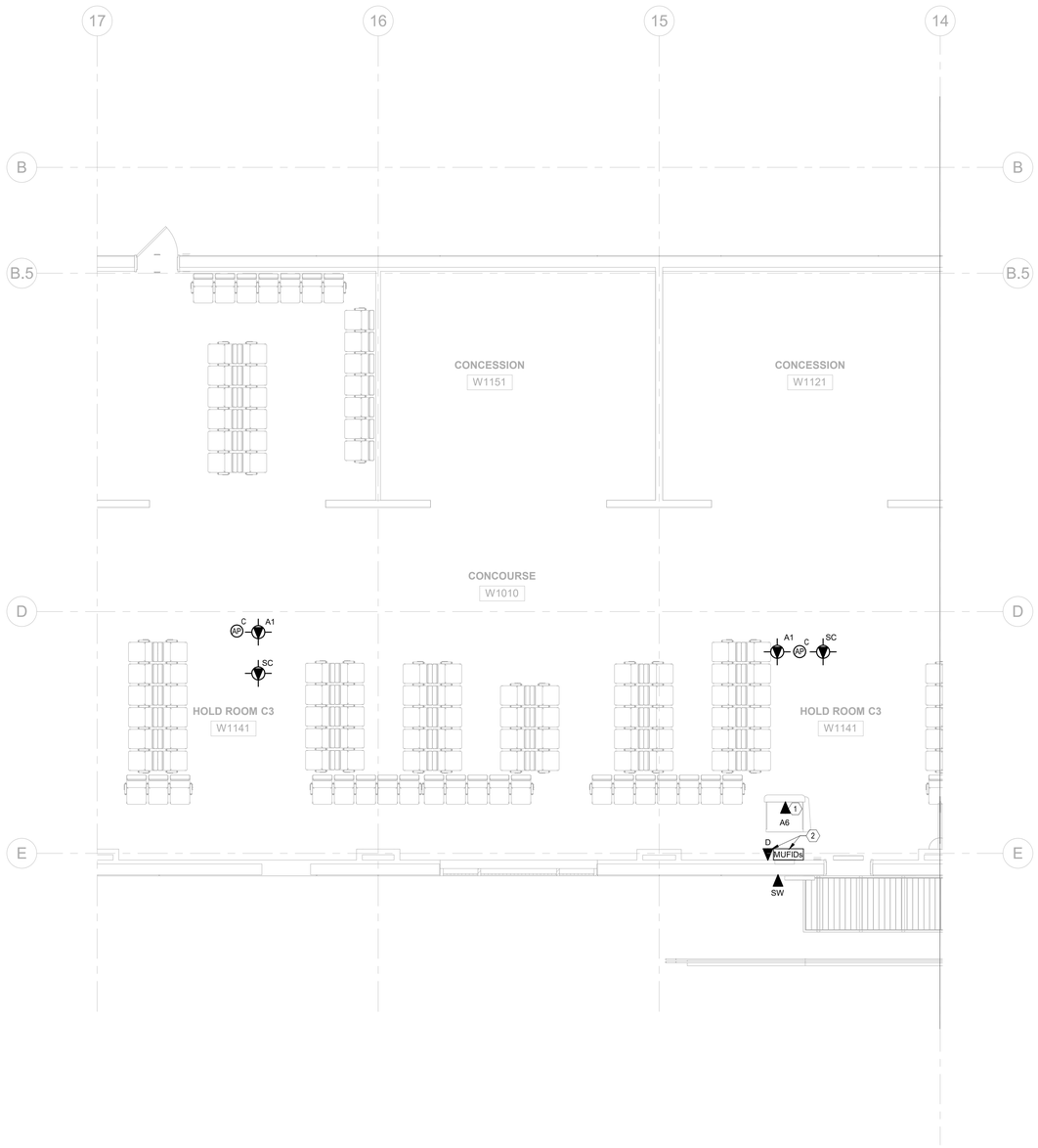

1 LEVEL 1 - TECHNOLOGY - AREA 4
3/16" = 1'-0"

GENERAL NOTES

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OKALOOSA COUNTY

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ENLARGED FLOOR PLAN LEVEL 1 - AREA 4

BID DOCUMENT

Drawing No.:

T214

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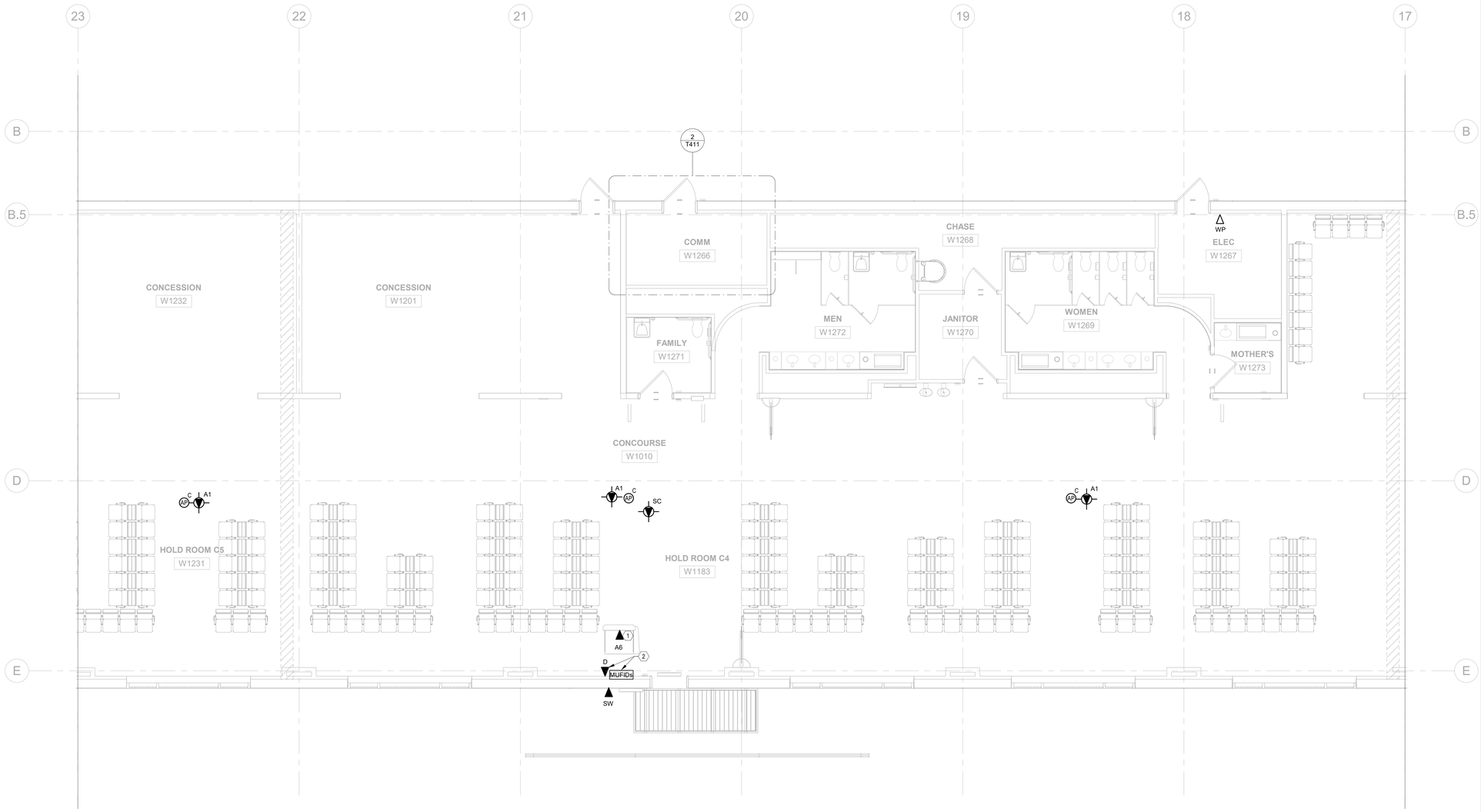

1 LEVEL 1 - TECHNOLOGY - AREA 5
3/16" = 1'-0"

GENERAL NOTES

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KEYED NOTES:

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ENLARGED FLOOR PLAN LEVEL 1 - AREA 5

BID DOCUMENT

Drawing No.:

T215

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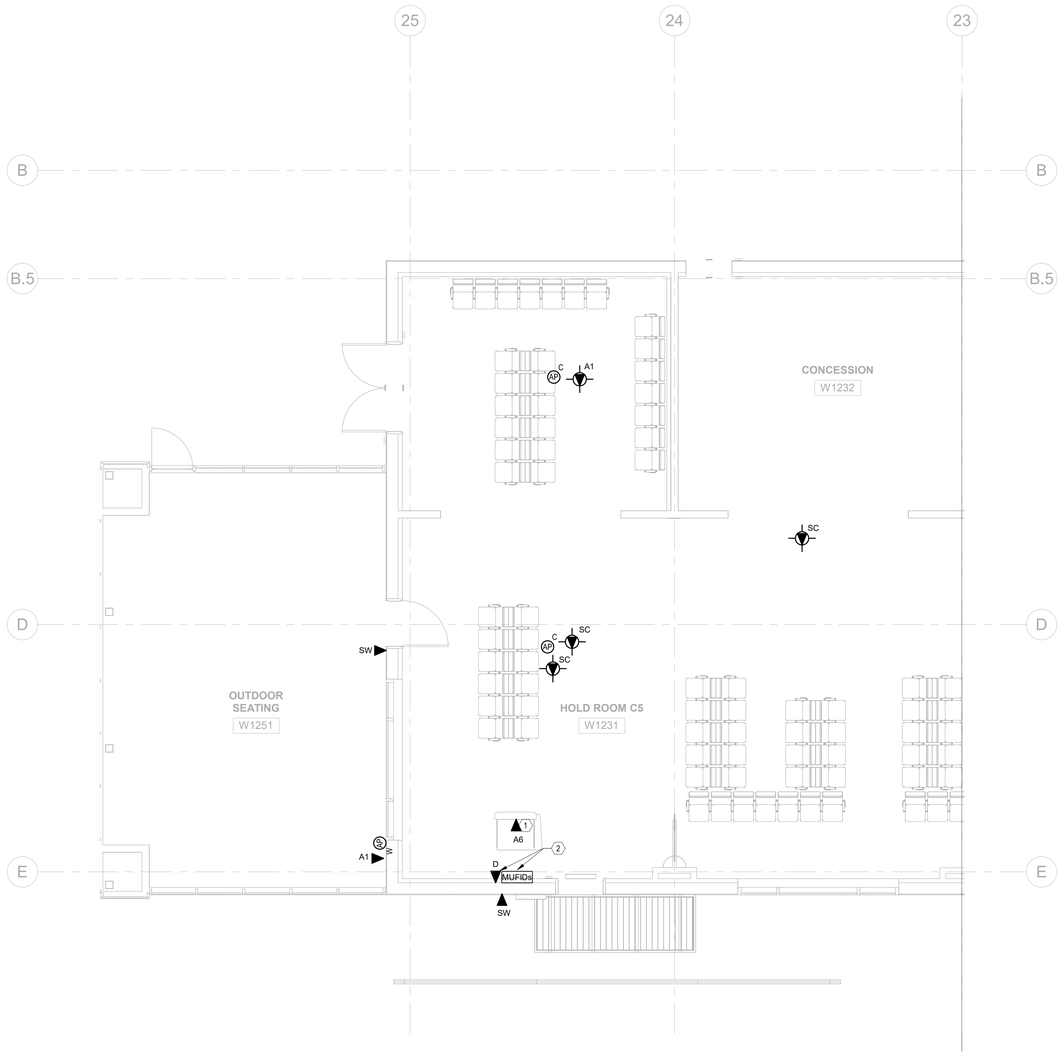

1 LEVEL 1 - TECHNOLOGY - AREA 6
3/16" = 1'-0"

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ENLARGED FLOOR PLAN LEVEL 1 - AREA 6

BID DOCUMENT

Drawing No.:

T216

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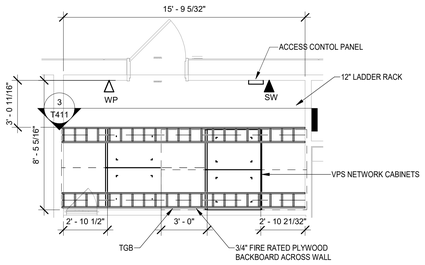
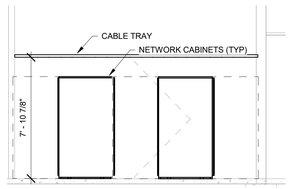
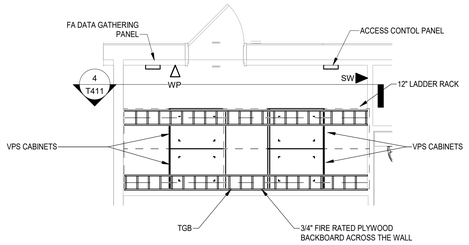


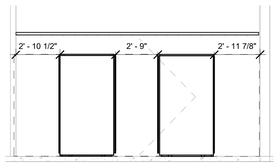
1 COMM ROOM W1277 - ENLARGED ROOM PLAN
1/4" = 1'-0"



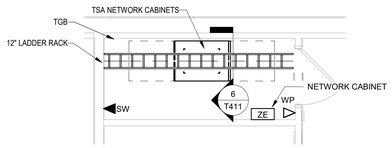
3 COMM ROOM W1277 - CABINET ELEVATIONS
1/4" = 1'-0"



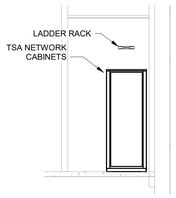
2 COMM ROOM W1266 - ENLARGED ROOM PLAN
1/4" = 1'-0"



4 COMM RM W1266 - CABINET ELEVATION
1/4" = 1'-0"



5 TSA IDF W1063 - ENLARGED ROOM PLAN
1/4" = 1'-0"



6 TSA IDF 1063 - CABINET ELEVATION
1/4" = 1'-0"

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ENLARGED ROOM PLANS - IDF

BID DOCUMENT

Drawing No.:

T411

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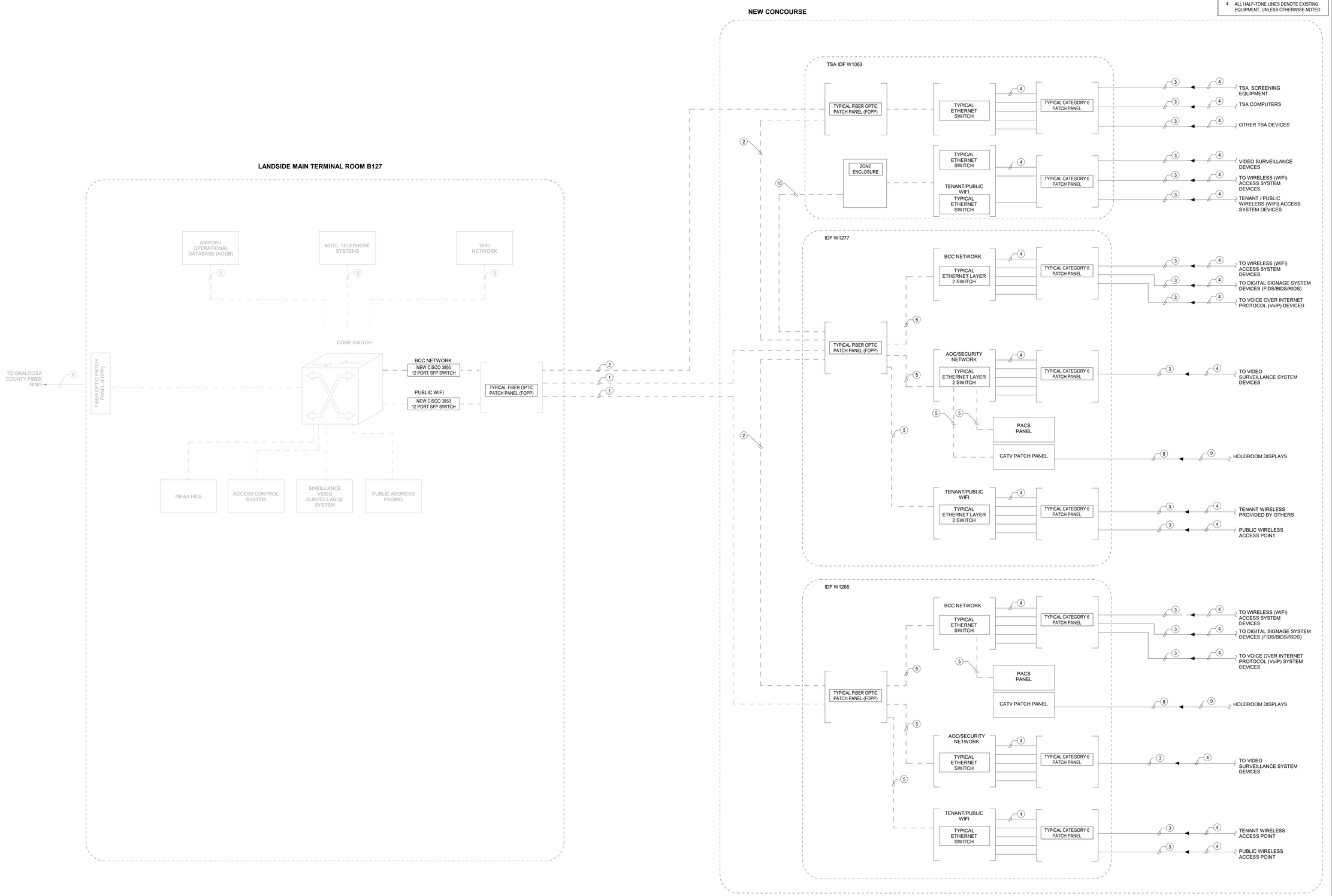
LEGEND

1. BACKBONE HORIZONTAL MULTI-MODE OM4 FIBER OPTIC CABLING, 48 STRANDS
2. HORIZONTAL MULTI-MODE OM4 FIBER OPTIC CABLING, 24 STRANDS
3. HORIZONTAL CATEGORY 6 CABLING
4. CATEGORY 6 PATCH CABLE, PROVIDE QUANTITY AS REQUIRED
5. FIBER OPTIC PATCH CABLE, SC TIPS PROVIDE QUANTITY AS REQUIRED
6. EXISTING COUNTY OWNED FIBER
7. NEW FIBER OPTIC PATCH PANEL SC WITH MULTI-MODE SC ADAPTERS
8. COAX RG6 QUAD SHIELDED PLENUM RATED CABLE WITH COMPRESSION FITTINGS
9. COAX PATCH CORD
10. COAX PATCH CORD

FIBER MEDIA
COPPER MEDIA
DATA DROP
EXISTING CORE SWITCH

GENERAL NOTES

1. THIS DRAWING IS DIAGRAMMATIC IN NATURE AND NOT INTENDED TO DEPICT ACTUAL DEVICE QUANTITIES. REFER TO FLOOR PLANS FOR DEVICE QUANTITIES. REFER TO SYSTEM DIAGRAMS FOR ADDITIONAL INFORMATION ON INDIVIDUAL NETWORK SYSTEMS.
2. CONTRACTOR SHALL PROVIDE ALL FIBER PATCH PANELS, PATCHING AND CONNECTIVITY TO THE EXISTING NETWORK. REFER TO THE NETWORK BACKBONE DIAGRAM FOR ADDITIONAL INFORMATION.
3. CONTRACTOR SHALL FURNISH AND INSTALL ALL PASSIVE AND ACTIVE NETWORK DEVICES FOR A COMPLETE AND FUNCTIONING SYSTEM. REFER TO DIVISION 27 SPECIFICATIONS FOR ADDITIONAL INFORMATION. CONTRACTOR SHALL COORDINATE ALL INSTALLATION ACTIVITIES WITH THE COUNTY.
4. ALL HALF-TONE LINES DENOTE EXISTING EQUIPMENT, UNLESS OTHERWISE NOTED.



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OKALOOSA COUNTY

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AA-C002208
MLM JOB # TYPE PROPERTY

JOHN E. BURNS
LICENSE
No 62139
STATE OF FLORIDA
PROFESSIONAL ENGINEER

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Revisions

No.	Date	Description

Project No.:	Project Number
Designed By:	AB
Drawn By:	AB
Checked By:	JB
Issue Date:	30-NOV-2020
Drawing Scale:	

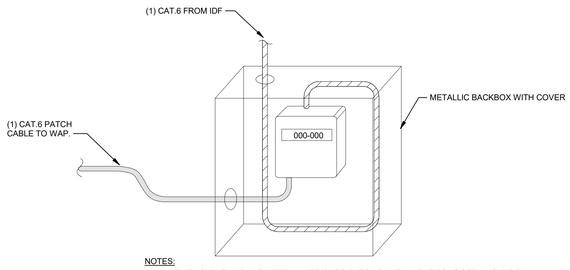
Drawing Title:

SINGLE LINE DIAGRAM - TECHNOLOGY

BID DOCUMENT

Drawing No.:

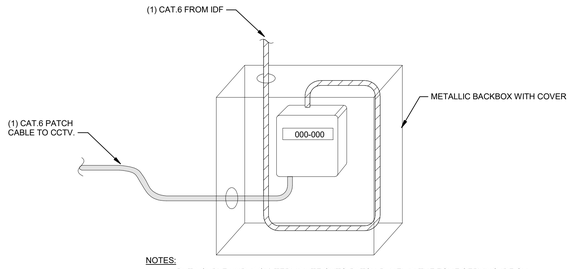
T511



NOTES:
1. DATA CABLE AND JACK, TERMINATE ONTO PATCH PANEL IN THE ZONE SERVING IDF ON LAST PORTS OF LAST DATA PATCH PANEL AND LABEL.
2. PROVIDE A METAL ENCLOSURE WTH COVER TO HOUSE DATA OUTLET AND ASSEMBLY. PROVIDE A
3. TELECOMMUNICATIONS CONTRACTOR SHALL LEAVE OPEN KNOCK-OUT ON METALLIC BACKBOX FOR PATCHING.
4. INCLUDE ASSOCIATED IDF AND UNIQUE IDENTIFICATION ON ENCLOSURE COVER.
5. TELECOMMUNICATIONS CONTRACTOR SHALL LEAVE 10 FEET OF SLACK NEATLY COILED IN CEILING FOR RELOCATION.

A1

1 AP ABOVE CEILING OUTLET DETAIL
WAP
NTS



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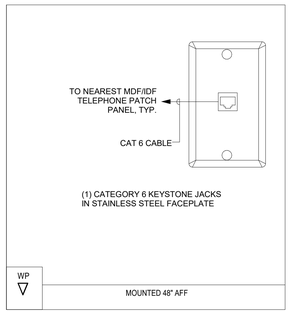
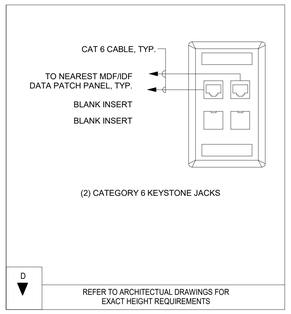
SC1

2 AP ABOVE CEILING OUTLET DETAIL
CCTV
NTS



3 DATA OUTLET DETAIL - TYPE WP
NTS



4 MUFIDS DISPLAY OUTLET DETAIL - TYPE D
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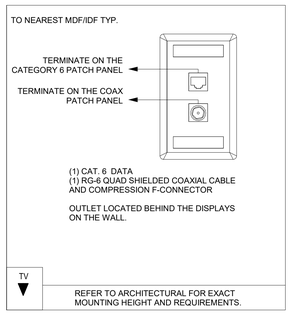
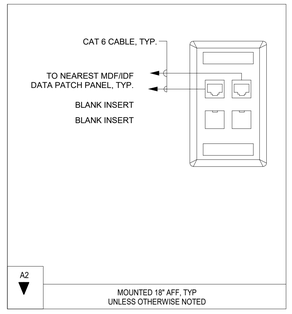


5 DATA OUTLET DETAIL - TYPE CATV
3" = 1'-0"



6 DATA OUTLET DETAIL - TYPE A2
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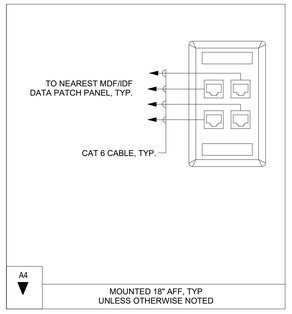

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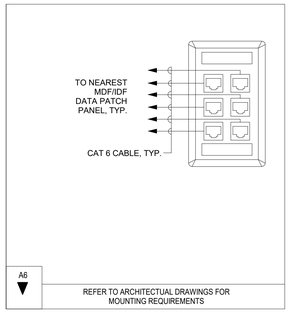

9 DATA OUTLET DETAIL - TYPE A6 - PODIUM
NTS

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DATA OUTLET DETAILS

BID DOCUMENT

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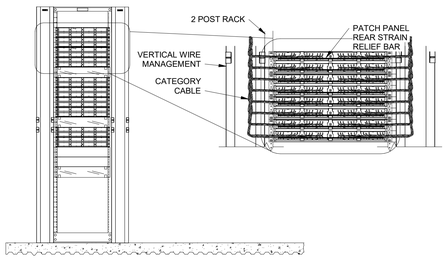
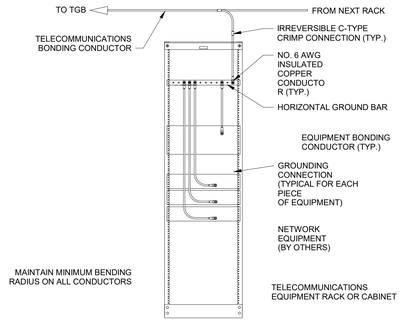
T810



1 REAR CABLE TERMINATION
NTS



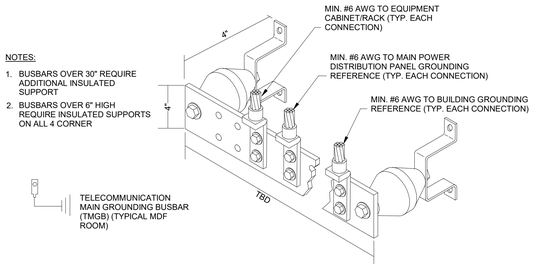
GENERAL NOTE

1. GROUNDING AND BONDING FOR ALL TELECOMMUNICATION EQUIPMENT AND PATHWAYS SHALL BE FURNISHED AND INSTALLED IN ACCORDANCE WITH ANSI/TIA-607-B.
2. GROUNDING AND BONDING WITHIN OCIO ROOMS, LAN ROOMS AND RIC LOCATION SHALL FOLLOW SECTION 4.6.3 (EXAMPLE B) OF ANSI/TIA-607-B

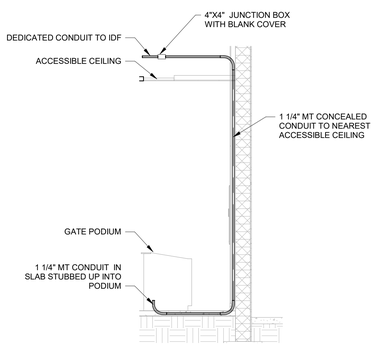
2 REAR RACK GROUNDING DETAIL
NTS

NOTES:

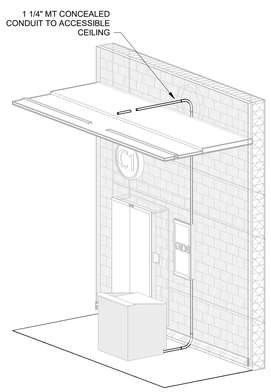
1. BUSBARS OVER 30" REQUIRE ADDITIONAL INSULATED SUPPORT
2. BUSBARS OVER 6" HIGH REQUIRE INSULATED SUPPORTS ON ALL 4 CORNER



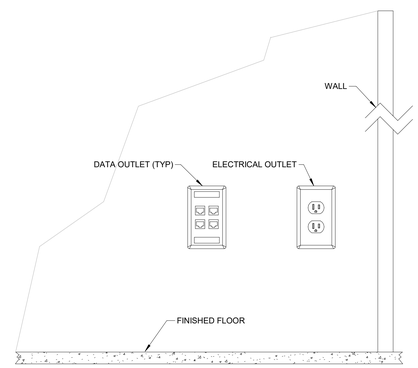
3 TELECOMMUNICATIONS BUSBAR
NTS



5 PODIUM CONDUITS DETAIL
NTS



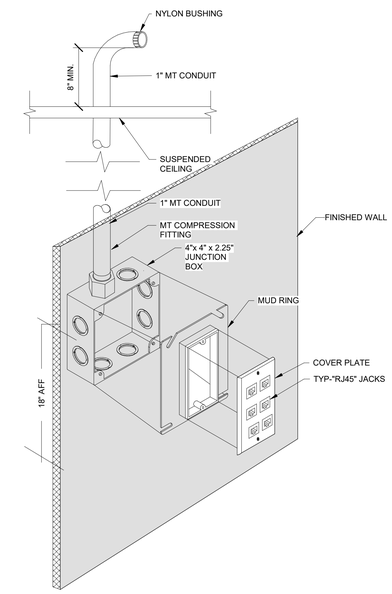
4 PODIUM CONDUIT ISOMETRIC VIEW



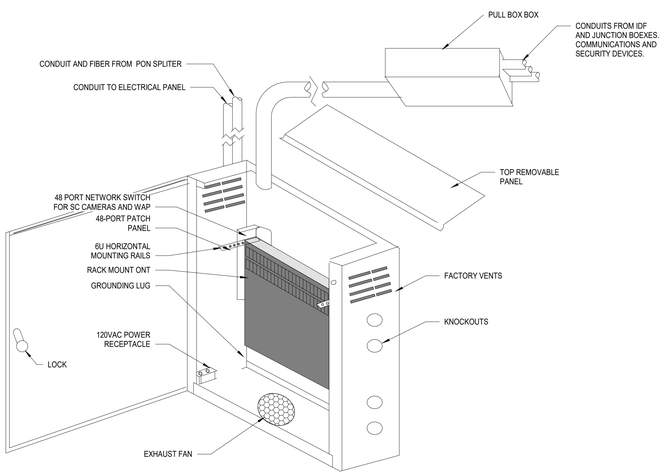
NOTES:

DATA OUTLETS SHALL BE MOUNTED ADJACENT TO THE ELECTRICAL OUTLET UNLESS OTHERWISE NOTED. REFER TO FLOOR PLANS FOR OUTLET TYPES.

6 DATA AND ELECTRICAL WALL MOUNTED DETAIL
NTS

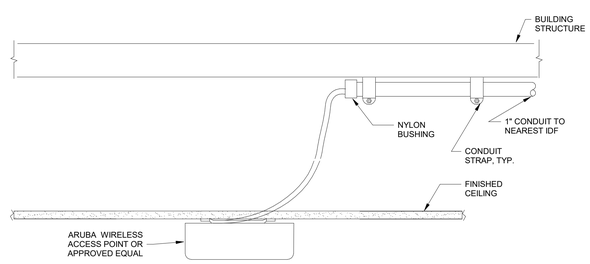


7 BACK BOX DETAIL
NTS



NOTES:
1. DATA CABLE SHALL BE TERMINATED IN JUNCTION BOX.
2. COORDINATED MOUNTING LOCATIONS WITH OTHER TRADES AND ARCHITECTURAL DRAWINGS.

8 SLIM WALL MOUNT ENCLOSURE TO DEVICE
NTS



9 WAP MOUNTING DETAIL
NTS

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Drawing Title:

DETAILS - TECHNOLOGY

BID DOCUMENT

Drawing No.:

T811

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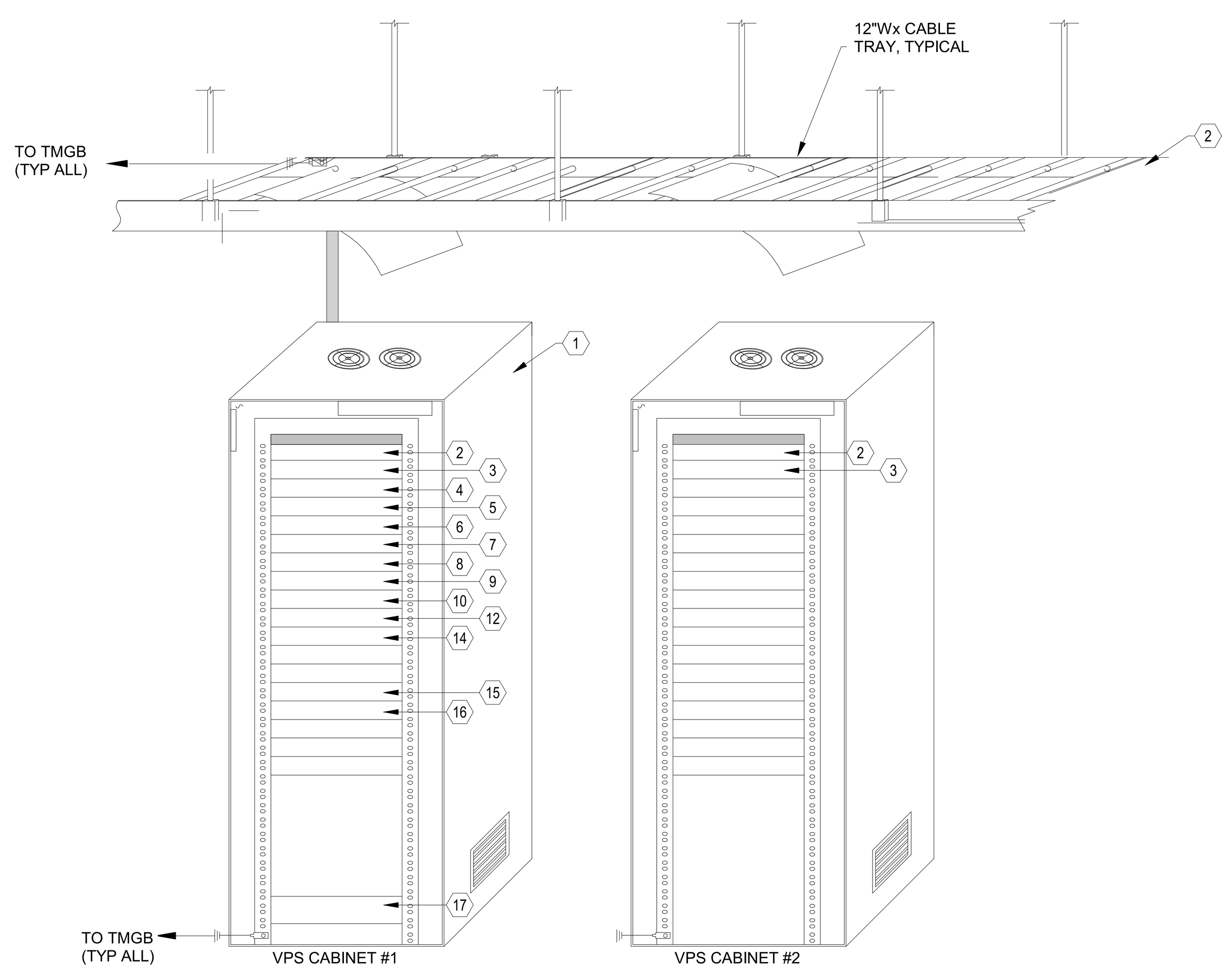
GENERAL CABINET/RACK NOTES:

1. THE CABINET/RACK ELEVATION DETAILS ARE DIAGRAMMATIC ONLY AND HAVE BEEN PROVIDED TO DEPICT THE GENERAL ARRANGEMENT AND INSTALLATION OF THE NETWORK COMMUNICATIONS, RADIO, AND ELECTRONIC SECURITY COMPONENTS. THE CONTRACTOR SHALL PROVIDE ALL COMMUNICATIONS, RADIO, AND SECURITY EQUIPMENT CABINETS/RACKS IN ACCORDANCE WITH THE REQUIREMENTS OF THE CONTRACT DOCUMENTS AND SHALL BE CONFIGURED TO SUPPORT ALL EQUIPMENT, COMPONENTS AND CABLING NECESSARY TO MEET THE PERFORMANCE REQUIREMENTS OF ALL SYSTEMS SPECIFIED. THE CONTRACTOR SHALL PROVIDE ALL ELECTRICAL POWER, GROUNDING, SYSTEM COMPONENTS, EQUIPMENT, AND ALL APPURTENANCES AS REQUIRED TO PROVIDE FULLY OPERATING SYSTEMS IN ACCORDANCE WITH ALL PROJECT REQUIREMENTS.
2. THE COMMUNICATIONS EQUIPMENT ROOMS ARE A SHARED SPACE BETWEEN THE COMMUNICATIONS NETWORKS AND SECURITY ELECTRONIC SYSTEMS. IT SHALL BE THE RESPONSIBILITY OF THE TELECOMMUNICATIONS INTEGRATOR TO COORDINATE WITH THE SECURITY INTEGRATOR FOR ALL SPACE REQUIREMENTS. THE TELECOMMUNICATIONS INTEGRATOR SHALL DEMONSTRATE AT THE TIME OF SHOP DRAWING SUBMISSION THAT THE COORDINATION BETWEEN THE TWO DIVISION INTEGRATORS HAS MET THIS COORDINATION REQUIREMENT.
3. THE CONTRACTOR SHALL REVIEW ALL COMMUNICATIONS, RADIO, AND ELECTRONIC SECURITY DRAWINGS AS WELL AS ALL DIVISION 13 AND 16 SPECIFICATION SECTIONS RELATED TO THE INSTALLATION AND CONFIGURATION OF ALL EQUIPMENT, COMPONENTS, ELECTRICAL POWER AND EQUIPMENT CABINETS/RACKS INCLUDED AS PART OF THIS PROJECT.
4. COORDINATE WITH ALL APPLICABLE TRADES IN SUBMITTAL OF SHOP DRAWINGS AND THE INSTALLATION OF ALL EQUIPMENT CABINETS/RACKS. ALL SHOP DRAWINGS SHALL DETAIL SPACE CONDITIONS IN ORDER TO ACCOMMODATE OTHER CONCERNED TRADES, ALL EQUIPMENT LOCATIONS ARE SUBJECT TO FINAL REVIEW BY THE ARCHITECT.
5. ALL ELECTRICAL POWER SERVING THE RACK MOUNTED UPS UNITS AND ALL ASSOCIATED COMMUNICATIONS, RADIO, AND SECURITY EQUIPMENT SHALL BE PROVIDED FROM DEDICATED EMERGENCY ELECTRICAL DISTRIBUTION PANELS LOCATED WITHIN EACH COMMUNICATIONS AND RADIO EQUIPMENT ROOMS. COORDINATE WITH ELECTRICAL DRAWINGS FOR EXACT LOCATION AND SIZE OF EACH ELECTRICAL DISTRIBUTION PANEL.
6. PROVIDE IDENTIFICATION OF ALL EQUIPMENT CABINETS/RACKS, CONTROL PANELS, SUB-CONTROL PANELS, REMOTE RELAY CABINETS AND SECURITY EQUIPMENT PANELS, SYSTEM INTERFACE CABINETS, AND SIMILAR EQUIPMENT WITH 1-1/2 INCH WHITE LETTERING. ENGRAVED LAMINATED PLASTIC SIGNS SHALL BE USED FOR IDENTIFICATION AND SECURELY FASTENED IN ACCORDANCE WITH THE PROJECT REQUIREMENTS.
7. WORK SHALL BE NEAT IN APPEARANCE, FREE OF ROUGH EDGES, SCRATCHES, BLEMISHES, CRACKS AND EXPOSED GAPS. ALL EQUIPMENT SHALL BE SECURED TO THE MOUNTING SURFACE, AND FASTENED WITH HARDWARE APPROVED BY THE MANUFACTURER AND CAPABLE OF SUPPORTING THE RATED LOAD. ALL CABLES WITHIN ENCLOSURES SHALL BE NEATLY ROUTED AND TIE-WRAPPED WITH VELCRO STRAPS AT 6 INCHES ON CENTER (NYLON TIE-WRAPS ARE NOT ACCEPTABLE), ALL WIRE SPLICES SHALL BE TERMINATED ON TERMINAL STRIPS, SPLICES UTILIZING WIRE NUTS SHALL NOT BE ACCEPTABLE.
8. ALL WIRING SHALL TERMINATE ON FIXED TERMINAL STRIPS, PUNCH BLOCKS OR PATCH PANELS IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS. NO SPLICES SHALL BE PERMITTED IN UNDERGROUND PULL BOXES AND NON-ACCESSIBLE JUNCTION BOXES. ALL JUNCTION BOXES CONTAINING ANY SYSTEM SPLICES SHALL BE UNIQUELY IDENTIFIED.
9. PROVIDE ALL EQUIPMENT CLEARANCES IN ACCORDANCE WITH NEC REQUIREMENTS. ARRANGE EQUIPMENT TO FACILITATE UNRESTRICTED ACCESS FOR MAINTENANCE AND SERVICE AROUND ALL EQUIPMENT, COMPONENTS AND/OR CABLE TERMINATIONS.
10. ALL CONTROL EQUIPMENT MUST HAVE TRANSIENT PROTECTION TO COMPLY WITH UL864 REQUIREMENTS. WHERE ANY CIRCUITS LEAVE THE BUILDING, ADDITIONAL TRANSIENT PROTECTION MUST BE PROVIDED FOR EACH CIRCUIT. DEVICES MUST BE UL LISTED UNDER STANDARD #497B (ISOLATED LOOP PROTECTORS). ALL EQUIPMENT CABINETS SHALL BE PROPERLY GROUNDED AND BONDED IN ACCORDANCE WITH NEC, IEEE AND MANUFACTURERS REQUIREMENTS.
11. ALL SYSTEM CABLING SHALL BE INSTALLED IN DEDICATED RACEWAYS OR CABLE TRAYS UNLESS OTHERWISE INDICATED.
12. ALL PENETRATIONS OF WALLS AND FLOORS SHALL BE FIRE STOPPED IN ACCORDANCE WITH THE ASTM AND NFPA. REFER TO RELATED SPECIFICATION SECTIONS FOR ADDITIONAL INFORMATION. INSTALLATION OF FIRE-STOPS SHALL BE PERFORMED BY AN APPLICATOR/INSTALLER QUALIFIED AND TRAINED BY THE MANUFACTURER. INSTALLATION SHALL BE PERFORMED IN STRICT ACCORDANCE WITH MANUFACTURER'S DETAILED INSTALLATION PROCEDURES.
13. REFER TO ALL RELATED SPECIFICATION SECTIONS FOR ADDITIONAL INFORMATION.
14. RACKS ARE SEPARATED FOR CLARITY PURPOSES ONLY. REFER TO FLOOR PLANS FOR EXACT LAYOUT AND QUANTITY.

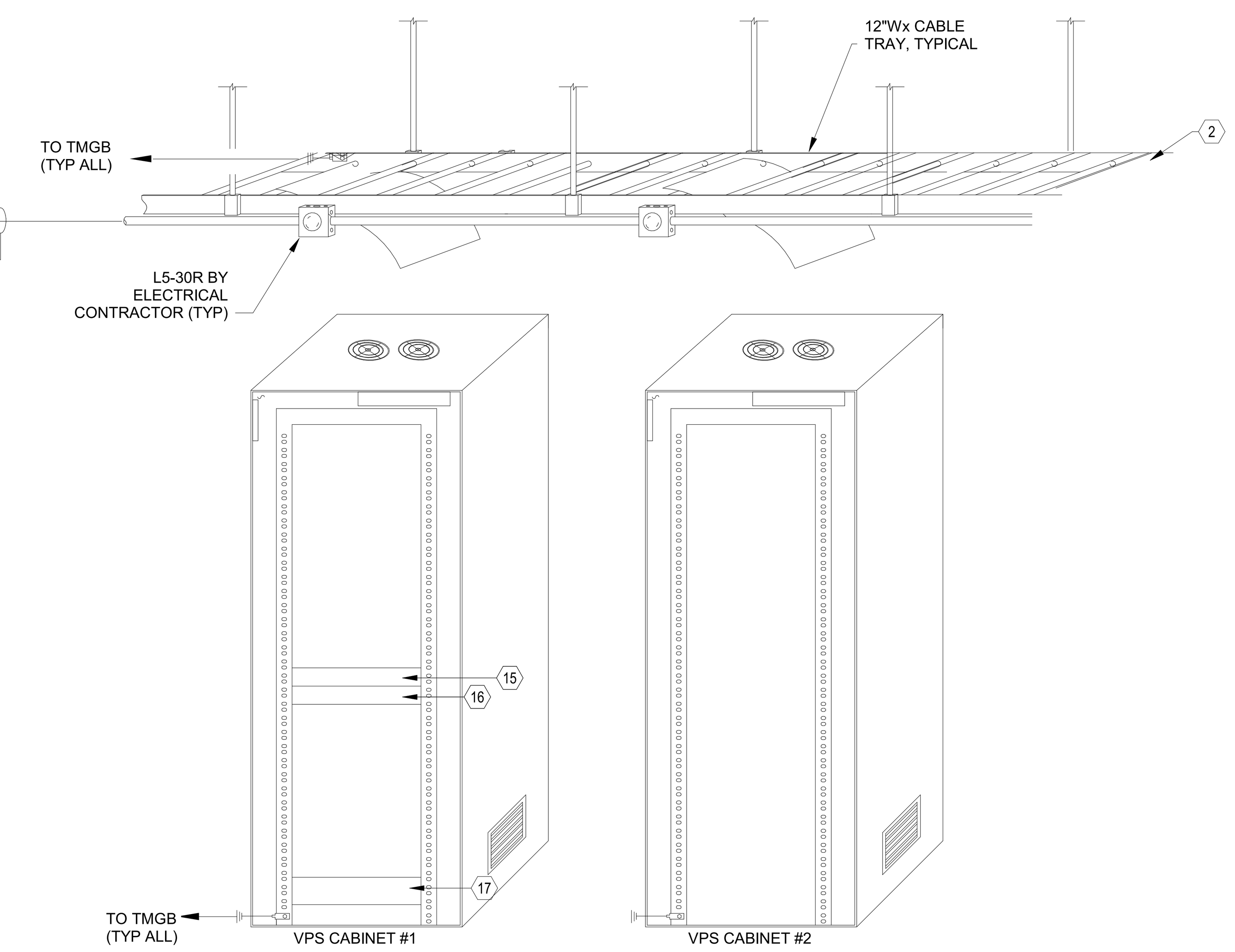
GENERAL EQUIPMENT NOTES:

1. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL EQUIPMENT, DEVICES, CABLING, CONNECTIVITY, PATCHING, MOUNTS AND SUPPORTS, APPURTENANCES AS INTENDED BY THE DRAWINGS.
2. THE CONTRACTOR SHALL USE THE FLOOR PLANS TO IDENTIFY THE EXACT QUANTIFY OF JACKS/FACEPLATES, AND FIELD DEVICES.
3. THE CONTRACTOR SHALL PROVIDE TERMINATE CCTV DATA ONTO A DEDICATED PATCH PANEL IN CABINET #1.
4. THE CONTRACTOR SHALL PROVIDE CISCO 3850 NETWORK SWITCH TO ACCOMMODATE THE AMOUNT OF CABLES WITHIN EACH IDF.



FRONT VIEW

SEE ELECTRICAL DRAWINGS FOR POWER REQUIREMENTS. TYP.



REAR VIEW

	CABINET 1 KEY NOTES: IDF
1	84"Hx30"Wx42"D EQUIPMENT CABINET STANDARD TIA 19" RACK WITH VERTICAL AND HORIZONTAL WIRE MANAGEMENT
2	48 PORT FOPP (PROVIDE SPLICE PANELS AND FANOUT KITS)
3	1U HORIZONTAL WIRE MANAGEMENT
4	2U CAT. 6A 48 PORT PATCH PANEL
5	1U HORIZONTAL WIRE MANAGEMENT
6	2U CAT. 6A 48 PORT PATCH PANEL
7	1U HORIZONTAL WIRE MANAGEMENT
8	2U BLANK PANEL
9	2U BLANK PANEL
10	1U HORIZONTAL WIRE MANAGEMENT
11	2U CISCO 3850 48 PORT (BCC NETWORK SWITCH)
12	1U HORIZONTAL WIRE MANAGEMENT
13	2U CISCO 3850 48 PORT (SECURITY NETWORK SWITCH)
14	1U HORIZONTAL WIRE MANAGEMENT
15	2U CISCO 3850 48 PORT (WIFI NETWORK SWITCH)
16	1U HORIZONTAL WIRE MANAGEMENT
17	VERTICAL POWER DISTRIBUTION UNIT
18	VERTICAL POWER DISTRIBUTION UNIT
17	APC 3000VA SMART-UPS (MODEL SMT3000RM2U)
NOTE: ALL KEYED NOTES MAY NOT APPEAR IN EQUIPMENT CABINETS.	

	CABINET #2 KEYED NOTES: IDF
1	84"Hx30"Wx42"D EQUIPMENT CABINET STANDARD TIA 19" RACK WITH VERTICAL AND HORIZONTAL WIRE MANAGEMENT
17	APC 3000VA SMART-UPS (MODEL SMT3000RM2U)
NOTE: ALL KEYED NOTES MAY NOT APPEAR IN EQUIPMENT CABINETS.	

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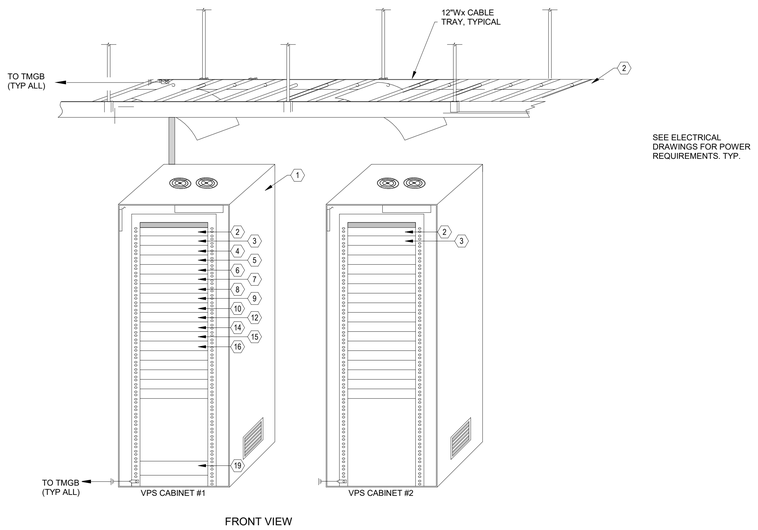
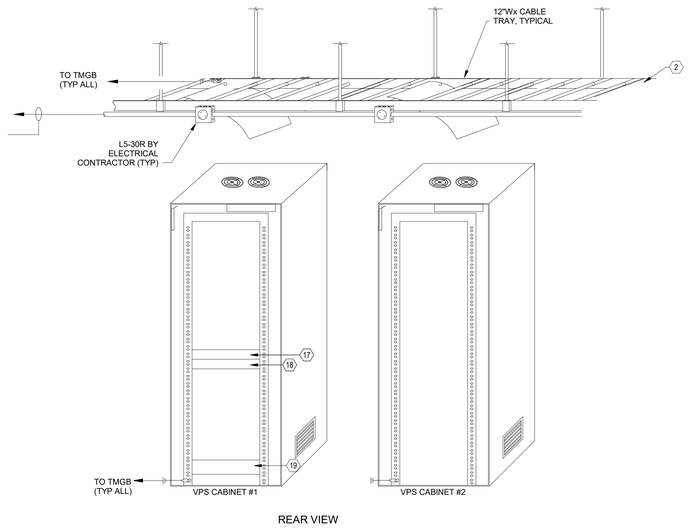
5. ALL ELECTRICAL POWER SERVING THE RACK MOUNTED UPS UNITS AND ALL ASSOCIATED COMMUNICATIONS, RADIO, AND SECURITY EQUIPMENT SHALL BE PROVIDED FROM DEDICATED EMERGENCY ELECTRICAL DISTRIBUTION PANELS LOCATED WITHIN EACH COMMUNICATIONS AND RADIO EQUIPMENT ROOMS. COORDINATE WITH ELECTRICAL DRAWINGS FOR EXACT LOCATION AND SIZE OF EACH ELECTRICAL DISTRIBUTION PANEL.
6. PROVIDE IDENTIFICATION OF ALL EQUIPMENT CABINETS/RACKS, CONTROL PANELS, SUB-CONTROL PANELS, REMOTE RELAY CABINETS AND SECURITY EQUIPMENT PANELS, SYSTEM INTERFACE CABINETS, AND SIMILAR EQUIPMENT WITH 1-1/2 INCH WHITE LETTERING. ENGRAVED LAMINATED PLASTIC SIGNS SHALL BE USED FOR IDENTIFICATION AND SECURELY FASTENED IN ACCORDANCE WITH THE PROJECT REQUIREMENTS.
7. WORK SHALL BE NEAT IN APPEARANCE, FREE OF ROUGH EDGES, SCRATCHES, BLEMISHES, CRACKS AND EXPOSED GAPS. ALL EQUIPMENT SHALL BE SECURED TO THE MOUNTING SURFACE, AND FASTENED WITH HARDWARE APPROVED BY THE MANUFACTURER AND CAPABLE OF SUPPORTING THE RATED LOAD. ALL CABLES WITHIN ENCLOSURES SHALL BE NEATLY ROUTED AND TIE-WRAPPED WITH VELCRO STRAPS AT 6 INCHES ON CENTER (NYLON TIE-WRAPS ARE NOT ACCEPTABLE). ALL WIRE SPLICES SHALL BE TERMINATED ON TERMINAL STRIPS. SPLICES UTILIZING WIRE NUTS SHALL NOT BE ACCEPTABLE.
8. ALL WIRING SHALL TERMINATE ON FIXED TERMINAL STRIPS, PUNCH BLOCKS OR PATCH PANELS IN ACCORDANCE WITH THE PROJECT SPECIFICATIONS. NO SPLICES SHALL BE PERMITTED IN UNDERGROUND PULL BOXES AND NON-ACCESSIBLE JUNCTION BOXES. ALL JUNCTION BOXES CONTAINING ANY SYSTEM SPLICES SHALL BE UNIQUELY IDENTIFIED.
9. PROVIDE ALL EQUIPMENT CLEARANCES IN ACCORDANCE WITH NEC REQUIREMENTS. ARRANGE EQUIPMENT TO FACILITATE UNRESTRICTED ACCESS FOR MAINTENANCE AND SERVICE AROUND ALL EQUIPMENT, COMPONENTS AND/OR CABLE TERMINATIONS.
10. ALL CONTROL EQUIPMENT MUST HAVE TRANSIENT PROTECTION TO COMPLY WITH UL864 REQUIREMENTS. WHERE ANY CIRCUITS LEAVE THE BUILDING, ADDITIONAL TRANSIENT PROTECTION MUST BE PROVIDED FOR EACH CIRCUIT. DEVICES MUST BE UL LISTED UNDER STANDARD #497B (ISOLATED LOOP PROTECTORS). ALL EQUIPMENT CABINETS SHALL BE PROPERLY GROUNDED AND BONDED IN ACCORDANCE WITH NEC, IEEE AND MANUFACTURERS REQUIREMENTS.
11. ALL SYSTEM CABLING SHALL BE INSTALLED IN DEDICATED RACEWAYS OR CABLE TRAYS UNLESS OTHERWISE INDICATED.
12. ALL PENETRATIONS OF WALLS AND FLOORS SHALL BE FIRE STOPPED IN ACCORDANCE WITH THE ASTM AND NFPA. REFER TO RELATED SPECIFICATION SECTIONS FOR ADDITIONAL INFORMATION. INSTALLATION OF FIRE-STOPS SHALL BE PERFORMED BY AN APPLICATOR/INSTALLER QUALIFIED AND TRAINED BY THE MANUFACTURER. INSTALLATION SHALL BE PERFORMED IN STRICT ACCORDANCE WITH MANUFACTURER'S DETAILED INSTALLATION PROCEDURES.
13. REFER TO ALL RELATED SPECIFICATION SECTIONS FOR ADDITIONAL INFORMATION.
14. RACKS ARE SEPARATED FOR CLARITY PURPOSES ONLY. REFER TO FLOOR PLANS FOR EXACT LAYOUT AND QUANTITY.

GENERAL EQUIPMENT NOTES:

1. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL EQUIPMENT, DEVICES, CABLING, CONNECTIVITY, PATCHING, MOUNTS AND SUPPORTS, APPURTENANCES AS INTENDED BY THE DRAWINGS.
2. THE CONTRACTOR SHALL USE THE FLOOR PLANS TO IDENTIFY THE EXACT QUANTIFY OF JACKS/FACEPLATES, AND FIELD DEVICES.
3. THE CONTRACTOR SHALL PROVIDE TERMINATE CCTV DATA ONTO A DEDICATED PATCH PANEL IN CABINET #1.
4. THE CONTRACTOR SHALL PROVIDE CISCO 3850 NETWORK SWITCH TO ACCOMMODATE THE AMOUNT OF CABLES WITHIN EACH IDF.



FRONT VIEW



REAR VIEW

1 IDF W1277 RACK ELEVATIONS
3/4" = 1'-0"

	CABINET 1 KEY NOTES: IDF
1	84"Hx30"Wx42"D EQUIPMENT CABINET STANDARD TIA 19" RACK WITH VERTICAL AND HORIZONTAL WIRE MANAGEMENT
2	48 PORT FOPP (PROVIDE SPLICE PANELS AND FANOUT KITS)
3	1U HORIZONTAL WIRE MANAGEMENT
4	2U CAT. 6A 48 PORT PATCH PANEL
5	1U HORIZONTAL WIRE MANAGEMENT
6	2U CAT. 6A 48 PORT PATCH PANEL
7	1U HORIZONTAL WIRE MANAGEMENT
8	2U BLANK PANEL
9	2U BLANK PANEL
10	1U HORIZONTAL WIRE MANAGEMENT
11	2U CISCO 3850 48 PORT (BCC NETWORK SWITCH)
12	1U HORIZONTAL WIRE MANAGEMENT
13	2U CISCO 3850 48 PORT (SECURITY NETWORK SWITCH)
14	1U HORIZONTAL WIRE MANAGEMENT
15	2U CISCO 3850 48 PORT (WIFI NETWORK SWITCH)
16	1U HORIZONTAL WIRE MANAGEMENT
17	VERTICAL POWER DISTRIBUTION UNIT
18	VERTICAL POWER DISTRIBUTION UNIT
19	APC 3000VA SMART-UPS (MODEL SMT3000RM2U)

NOTE: ALL KEYED NOTES MAY NOT APPEAR IN EQUIPMENT CABINETS.

	CABINET #2 KEYED NOTES: IDF
1	84"Hx30"Wx42"D EQUIPMENT CABINET STANDARD TIA 19" RACK WITH VERTICAL AND HORIZONTAL WIRE MANAGEMENT
17	VERTICAL POWER DISTRIBUTION UNIT
18	VERTICAL POWER DISTRIBUTION UNIT
19	APC 3000VA SMART-UPS (MODEL SMT3000RM2U)

NOTE: ALL KEYED NOTES MAY NOT APPEAR IN EQUIPMENT CABINETS.

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Revisions

No.	Date	Description

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Designed By:	AB
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Drawing Title:

IDF W1277 RACK ELEVATION

BID DOCUMENT

Drawing No.:

T902

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MOUNTING HEIGHTS

CEILING	SMOKE AND HEAT DETECTORS, 360° SECURITY MOTION DETECTORS, CCTV SURVEILLANCE CAMERAS, PUBLIC ADDRESS AND VOICE EVACUATION SPEAKERS, WIRELESS ACCESS POINTS. TV AND LCD PROJECTOR JACKS
8' A.F.G.	EXTERIOR VISUAL AND AUDIO/VISUAL FIRE ALARM NOTIFICATION DEVICES, EXTERIOR PUBLIC ADDRESS SPEAKERS.
7'-5" A.F.F.	CLOCKS, COMBINATION CLOCK/SPEAKERS, TRUMPET SPEAKERS
7'-0" A.F.F.	VISUAL AND AUDIO/VISUAL FIRE ALARM NOTIFICATION DEVICES, WALL MOUNTED SECURITY MOTION DETECTORS (CENTER OF DEVICE)
6" ABOVE DOOR JAMB	REQUEST TO EXIT MOTION DETECTORS
5'-6" A.F.F	TOP OF PLYWOOD TELEPHONE BACKBOARD
5'-4" A.F.F.	FIRE ALARM ANNUNCIATOR PANELS, FIRE FIGHTER CONTROL STATIONS, SECURITY ANNUNCIATOR PANELS
4'-8" A.F.G. MAX	PEDESTAL MOUNT INTERCOM PEDESTAL MOUNT CARD READER
4'-0" A.F.F.	"PS" TELEPHONE OUTLETS (TOP OF COIN SLOT),(WALL MOUNTED)-TELEPHONE INSTRUMENTS , INTERCOM STATIONS, FIRE FIGHTER TELEPHONE JACKS, FIRE ALARM MANUAL STATIONS, CARD READERS, MANUAL REQUEST TO EXIT DEVICES, WALL MOUNTED DURESS ALARM STATIONS, RESCUE ASSISTANCE PANELS, LCD KEYPADS (CENTER OF DEVICE)
UNDER COUNTER OR DESK	DURESS ALARM BUTTONS, DOOR RELEASE BUTTOMS
1'-6" A.F.F.	DATA/TELEPHONE JACKS, LOW TELEVISION JACKS, MICROPHONE JACKS
0'-0"	IN FLOOR JUNCTION BOXES FLUSH TO FINISHED FLOOR (FF) (DATA, TELEPHONE, MICROPHONE, MEDIA)

1. IN MASONRY CONSTRUCTION THE MOUNTING HEIGHTS SHALL BE USED FOR REFERENCE TO THE NEAREST BLOCK OR BRICK COURSING.
2. THE ABOVE MOUNTING ELEVATIONS ARE TO CENTER OF DEVICE AND SHALL BE ADHERED TO UNLESS SPECIFICALLY NOTED OR DETAILED OTHERWISE ON THE DRAWINGS AND/OR SPECIFICATIONS.
3. COORDINATE THE INSTALLATION AND MOUNTING ELEVATIONS OF ALL EQUIPMENT, DEVICES, CONTROLS AND APPURTENANCES WITH ARCHITECT AND ALL AFFECTED TRADES PRIOR TO INSTALLATION. DOCUMENT ALL MOUNTING ELEVATIONS FOR ALL EQUIPMENT, DEVICES, CONTROLS AND APPURTENANCES AT THE TIME OF SHOP DRAWING SUBMITTAL

PAGING ABBREVIATIONS

A/AMP	AMPERE
AC	ALTERNATING CURRENT
ACC	ACCENT
ACR	ATTENUATION/CROSSTALK RATIO
ADJ	ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AL	ALUMINUM
AM	AMMETER
APPROX	APPROXIMATELE(LY)
ASY	ASYMETRIC
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BATT	BATTERY
BFC	BELOW FINISHED CEILING
BKR	BREAKER
BLDG	BUILDING
BLK	BLACK
BRKT	BRACKET
C	CONDUIT
CAB	CABINET
CATV	CABLE TELEVISION
CB	CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TELEVISION
cd	CANDELA
CIR/CKT	CIRCUIT
CLF	CURRENT LIMITING FUSE
CLG	CEILING
CLR	CLEAR
COL	COLUMN
COMM	COMMUNICATION
CT	CURRENT TRANSFORMER
CU	COPPER
CW	COOL WHITE
DAS	DISTRIBUTED ANTENNA SYSTEM
dB	DECIBEL
DC	DIRECT CURRENT
DE	DUAL ELEMENT
DED	DEDICATED
DIA	DIAMETER
DISC	DISCONNECT
DNLT	DOWNLIGHT
DP	DISTRIBUTION PANEL
DPDT	DOUBLE POLE DOUBLE-THROW
DWG	DRAWING
EA	EACH
EC	ELECTRICAL CONTRACTOR
EF	EXHAUST FAN
EIA	ELECTRONICS INDUSTRY ASSOCIATION
ELEC	ELECTRICAL
ELEV	ELEVATOR
EMERG	EMERGENCY
EO	ELECTRICALLY OPERATED
EQIP	EQUIPMENT
ESB	ENERGY SAVING BALLAST
EVIDS	ELECTRONIC VIDEO INFORMATION DISPLAY SYSTEM
EWC	ELECTRIC WATER COOLER
FA	FIRE ALARM
FAA	FIRE ALARM ANNUNCIATOR
FAAP	FIRE ALARM ANNUNCIATOR PANEL
FACP	FIRE ALARM CONTROL PANEL
FAGP	FIRE ALARM GRAPHIC ANNUNCIATOR PANEL
FEXT	FAR END CROSSTALK
FIXT	FIXTURE
FL	FLOOR
FLA	FULL LOAD AMPERES
FLOUR	FLUORESCENT
FT	FOOTCANDLES
FVNR	FULL VOLTAGE NON-REVERSING
GC	GENERAL CONTRACTOR
GEN	GENERATOR
GFI	GROUND FAULT INTERRUPTER
GND/G	GROUND
HH	HAND HOLE
HID	HIGH INTENSITY DISCHARGE
HP	HORSEPOWER
HPF	HIGH POWER FACTOR
HV	HIGH VOLTAGE
HVAC	HEATING VENTILATING AIR CONDITIONING
HZ	HERTZ
IG	ISOLATED GROUND
INCAN	INCANDESCENT
IPS	INVERTER POWER SUPPLY
JB	JUNCTION BOX
KVA	KILOVOLT AMPERE
KVAR	KILOVAR (REACTANCE)
KW	KILOWATT
KWH	KILOWATT HOUR METER
LA	LIGHTNING ARRESTER
LED	LIGHT EMITTING DIODE
LT	LIGHT
LTG	LIGHTING
LV	LOW VOLTAGE
MATV	MASTER ANTENNA TELEVISION
MC	MECHANICAL CONTRACTOR
MCB	MAIN CIRCUIT BREAKER
MCC	METAL-CLAD CABLE
MCC	MOTOR CONTROL CENTER
MCP	MOTOR CIRCUIT PROTECTOR
MDP	MAIN DISTRIBUTION PANEL
MFR	MANUFACTURER
MH	MANHOLE
MH	METAL HALIDE
MISC	MISCELLANEOUS
MLO	MAIN LUGS ONLY
MM	MILLIMETER
MOD	MOTOR OPERATED DAMPER
MTD	MOUNTED
MTG HT	MOUNTING HEIGHT
MTS	MANUAL TRANSFER SWITCH
MUFIDS	MULTI-USER FLIGHT INFORMATION DISPLAY
MV	MILLIVOLT
MV	MEDIUM VOLTAGE
N/A	NOT AVAILABLE/NOT APPLICABLE
NEC	NATIONAL ELECTRIC CODE
NEMA	NATIONAL ELECTRIC MFR ASSOCIATION
NEXT	NEAR END CROSSTALK
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT
NO	NORMALLY OPENED
NTS	NOT TO SCALE
OC	ON CENTER
OH	OVERHEAD
OL	OVERLOAD HEATER ELEMENT
P	POLE
PB	PULL BOX
PEW	PEWTER
PLY	PLYWOOD
PNL	PANEL
PP	POWER PANEL
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHORIDE
RECPT	RECEPTACLE
REFL	REFLECTOR
REQ	REQUIRED
RGS	RIGID GALVANIZED STEEL CONDUIT
RIO	ROUGH IN ONLY
RM	ROOM
RS	RAPID START
SCH	SCHEDULE
SPDT	SINGLE POLE SINGLE THROW
SPST	SINGLE POLE DOUBLE THROW
SSB	SOLID STATE BALLAST
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
TELE	TELEPHONE
TIA	TELECOMMUNICATIONS INDUSTRY ASSOCIATION
TSB	TECHNICAL SERVICE BULLETIN
TSP	TWISTED SHIELDED PAIR
TT	TWIN TUBE
TYP	TYPICAL
UL	UNDERWRITER'S LABORATORIES
UON	UNLESS OTHERWISE NOTED
UPS	UNINTERRUPTABLE POWER SUPPLY
UTP	UNSHIELDED TWISTED PAIR
V	VOLT
VM	VOLTMETER
VP	VAPOR PROOF
W	WATT
W/	WITH
W/I	WITHIN
W/O	WITHOUT
WAP	WIRELESS ACCESS POINT
WP	WEATHERPROOF
WW	WARM WHITE
XFMR	TRANSFORMER
XP	EXPLOSION PROOF

GENERAL PAGING SYSTEM NOTES:

1. THE FOLLOWING GENERAL NOTES AS LISTED BELOW SHALL APPLY TO ALL PAGING SYSTEM REQUIREMENTS AS INDICATED ON ALL TP SERIES CONTRACT DRAWINGS.
2. THE EXTENT OF THE PAGING SYSTEM WORK FOR THIS PROJECT SHALL CONSIST OF THE GENERAL CONTRACTOR PROVIDING ALL CABLING, CONDUITS, BACKBOXES, DEVICES, COMPONENTS, ACTIVE ELECTRONICS, PROCESSORS, SERVERS, AND APPURTENANCES NECESSARY TO SUPPORT THE COMPLETE INSTALLATION OF THE PAGING SYSTEM IN ACCORDANCE WITH THE CONTRACT DRAWINGS. REFER TO RELATED DIVISION SPECIFICATION SECTIONS FOR ADDITIONAL INFORMATION.
3. THE COMMUNICATIONS EQUIPMENT ROOM SHALL BE A SHARED SPACE BETWEEN THE ELECTRONIC SECURITY, THE DATA/TELECOMMUNICATIONS AND PAGING SYSTEMS. IT SHALL BE THE RESPONSIBILITY OF ALL CONTRACTORS TO COORDINATE WITH ALL AFFECTED TRADES FOR PROPER EQUIPMENT SPACE REQUIREMENTS. ALL CONTRACTORS SHALL DEMONSTRATE AT THE TIME OF SHOP DRAWING SUBMISSION THAT THE COORDINATION BETWEEN ALL AFFECTED TRADES HAS MET ALL COORDINATION REQUIREMENTS.
4. DUE TO SCALE OF THE DRAWINGS, ALL PAGING SYSTEM EQUIPMENT SYMBOLS ARE SHOWN ON DRAWINGS AS CLOSE AS POSSIBLE TO THEIR INTENDED LOCATION. CONTRACTOR SHALL COORDINATE IN THE FIELD THE PROPER INSTALLATION OF ALL EQUIPMENT, DEVICES, CONTROLS, CONDUITS AND CABLING. REFER TO RELATED SPECIFICATION SECTIONS FOR ADDITIONAL REQUIREMENTS.
5. THE CONTRACTOR SHALL COORDINATE WITH ALL AFFECTED TRADES ANY CONDITIONS RELATED TO THE PROPER INSTALLATION OF ALL SYSTEMS. COORDINATION SHALL BE BETWEEN ALL APPROPRIATE TRADES REGARDING ALL INSTALLATION REQUIREMENTS IMPACTING THE PLACEMENT OF ALL SYSTEM CONDUITS, HARDWARE AND COMPONENTS TO THE SATISFACTION OF ALL CONCERNED TRADES.
6. COORDINATE EXACT LOCATION OF ALL DESK OR COUNTER MOUNTED EQUIPMENT WITH OWNER AND ARCHITECT AND ALL AFFECTED TRADES PRIOR TO THE INSTALLATION OF ANY EQUIPMENT AND/OR CABLING.
7. COORDINATE EXACT LOCATION(S) OF ALL CEILING MOUNTED CABLE, CONDUITS, EQUIPMENT AND/OR DEVICES WITH ALL ARCHITECTURAL PLANS, REFLECTED CEILING PLANS AND ALL AFFECTED TRADES PRIOR TO INSTALLATION.
8. ALL EXTERIOR PAGING SPEAKERS SHALL BE RATED FOR THE ENVIRONMENTAL APPLICATION AND BE PROVIDED WEATHERPROOF HOUSINGS AS INDICATED. ALL EXTERIOR PAGING SPEAKERS SHALL MEET IP65 (NEMA 4) SEALING REQUIREMENTS.
9. ALL PAGING SYSTEM CABLING SHALL BE INSTALLED IN DEDICATED CONDUITS PROVIDED BY THE GENERAL CONTRACTOR. ALL CONDUITS SHALL BE SIZED AND INSTALLED IN ACCORDANCE WITH NFPA 70 AND RELATED PROJECT SPECIFICATIONS, COORDINATE WITH THE ESS INTEGRATOR PRIOR TO INSTALLATION. ALL CONDUITS SHALL BE A MINIMUM OF 3/4" UNLESS OTHERWISE NOTED.
10. ALL CONDUITS/RACEWAYS SHALL BE INSTALLED IN A MANNER THAT PREVENTS TAMPERING OR REMOVAL WHEN INSTALLED IN AREAS EXPOSED TO THE GENERAL POPULATION. PROVIDE TAMPER-RESISTANT INSTALLATION UTILIZING "TORX WITH PEG" SECURITY-FASTENING DEVICES FOR ALL CONDUITS/RACEWAYS, EQUIPMENT, DEVICES AND APPURTENANCES IN ALL AREAS ACCESSIBLE TO THE GENERAL POPULATION AND/OR AREAS SUBJECTED TO TAMPERING OR VANDALISM.
11. ALL SYSTEM WIRING, CONDUITS AND EQUIPMENT INSTALLATION SHALL BE IN ACCORDANCE WITH GOOD ENGINEERING PRACTICES AND BY ALL IEEE, EIA, NEC AND MANUFACTURER'S REQUIREMENTS. ALL WIRING SHALL COMPLY WITH ALL STATE AND LOCAL ELECTRICAL CODES AND SHALL TEST FREE FROM ALL GROUNDS, SHORTS STRAY VOLTAGES AND EMI.
12. PROVIDE ALL EQUIPMENT CLEARANCES IN ACCORDANCE WITH NEC REQUIREMENTS. ARRANGE EQUIPMENT TO FACILITATE UNRESTRICTED ACCESS FOR MAINTENANCE AND SERVICE AROUND ALL EQUIPMENT, COMPONENTS AND/OR CABLE TERMINATIONS.
13. PROPERLY GROUND ALL EQUIPMENT, RACKS, CABINET'S, CONDUITS AND CABLE SHIELDS IN ACCORDANCE WITH ALL REQUIREMENTS OF THE NFPA 70 AND EQUIPMENT MANUFACTURER. ALL EXTERIOR CCTV CAMERAS SHALL BE PROPERLY SURGE PROTECTED AND GROUNDED TO MINIMIZE DAMAGE DUE TO LIGHTNING STRIKES, SNEAK CURRENTS AND OTHER TRANSIENT VOLTAGE SPIKES. ALL SURGE PROTECTION AND GROUNDING SHALL BE IN ACCORDANCE WITH ALL REQUIREMENTS OF THE EQUIPMENT MANUFACTURER. NEC, IEEE AND TIA/EIA.
14. WHERE EQUIPMENT AND/OR JUNCTION BOXES ARE INSTALLED ABOVE FINISHED CEILINGS, THE CONTRACTOR SHALL PROVIDE ACCESS HATCHES LISTED FOR THE INTENDED APPLICATION. ACCESS HATCHES SHALL BE LOCATED SO THAT SERVICE ACCESS TO THE EQUIPMENT AND/OR JUNCTION BOXES IS UNIMPEDED.
15. ALL PENETRATIONS OF WALLS AND/OR FLOORS SHALL BE FIRE STOPPED IN ACCORDANCE WITH THE ASTM AND NFPA REQUIREMENTS. REFER TO RELATED SPECIFICATION SECTIONS FOR ADDITIONAL INFORMATION. INSTALLATION OF FIRE-STOPS SHALL BE PERFORMED BY AN APPLICATOR/INSTALLER QUALIFIED AND TRAINED BY THE MANUFACTURER. INSTALLATION SHALL BE PERFORMED IN STRICT ACCORDANCE WITH MANUFACTURER'S DETAILED INSTALLATION PROCEDURES.
16. ALL EQUIPMENT ENCLOSURES LOCATED OUTSIDE OR IN ALL AREAS WITH HIGH MOISTURE OR A RELATIVE HUMIDITY OF 75% OR GREATER SHALL BE NEMA 4X STAINLESS STEEL AND RATED FOR THAT APPLICATION.
17. ALL DEVICES, COMPONENTS OR EQUIPMENT INSTALLED ON THE EXTERIOR OF THE FACILITY SHALL BE PROVIDED IN ACCORDANCE WITH ALL MANUFACTURERS' REQUIREMENTS TO ENSURE THE PROPER OPERATION WHEN EXPOSED TO THE ENVIRONMENTAL CONDITIONS AND/OR AVERAGE ANNUAL LOWEST TEMPERATURE THAT CAN BE ANTICIPATED FOR THE GEOGRAPHIC REGION OF THE FACILITY.
18. ALL INTERIOR AND/OR EXTERIOR COMPONENTS, DEVICES OR SYSTEMS EQUIPMENT EXPOSED TO THE GENERAL POPULATION SHALL BE INSTALLED IN SECURED EQUIPMENTENCLOSURES WITH TAMPER SWITCHES AND INSTALLED IN SUCH A MANNER THAT RESISTS TAMPERING AND/OR REMOVAL WITHOUT THE USE OF SPECIALIZED TOOLS.
19. FOR EQUIPMENT INSTALLATIONS REQUIRING COORDINATION WITH OTHER TRADES THE CONTRACTOR SHALL PROVIDE ALL TEMPLATES, BACKBOXES AND EQUIPMENT ANCHOR BOLTS FOR MOUNTING OR FLUSH MOUNTING PREPARATION. (E.G. PEDESTALS OR OTHER DEVICES REQUIRING MOUNTING ON WALLS, CONCRETE PADS OR OTHER MATERIALS). COORDINATE DELIVERY OF TEMPLATES AND EQUIPMENT WITH ALL AFFECTED CONTRACTORS.
20. ALL CONTROL EQUIPMENT MUST HAVE TRANSIENT PROTECTION TO COMPLY WITH UL AND NFPA 70 REQUIREMENTS. WHERE ANY CIRCUITS LEAVE THE BUILDING, ADDITIONAL TRANSIENT PROTECTION MUST BE PROVIDED FOR EACH CIRCUIT. ALL TRANSIENT PROTECTION DEVICES MUST BE UL LISTED UNDER STANDARD #497B (ISOLATED LOOP PROTECTORS).
21. REFER TO SPECIFICATION SECTION 274215 AS WELL AS ALL RELATED SPECIFICATION SECTION FOR PROJECT SUBMITTAL REQUIREMENTS AND ADDITIONAL INFORMATION.

PUBLIC ADDRESS (PA) SYMBOL LEGEND

S XX	CEILING MOUNTED PAGING SPEAKER V = VOX CAPABILITY B = BI-DIRECTIONAL CAPABLE
S H	WALL MOUNTED PAGING SPEAKER V = VOX CAPABILITY B = BI-DIRECTIONAL CAPABLE WP = WEATHER PROOF
A	AMBIENT NOISE SENSING MICROPHONE

ITEM	SYSTEM	CONTRACTOR		OWNER		NOTES
		FURNISH	INSTALL	FURNISH	INSTALL	
1.0000	**DIVISION 27: PAGING**					
1.0100	HEADEND AND SOFTWARE	-	-	X	X	EXISTING PEAVEY PAGING SYTEM (HARDWARE / MEDIA/MATRIX (SOFTWARE)
1.0200	INTEGRATION TO EXISTING SYSTEM	X	X	-	-	PROGRAMMING, SPEAKERS ZONING / GROUPING
1.0300	INTERFACES	X	X	-	-	AMPLIFIERS, LINE CARDS, AUDIO BRIDGES
1.0400	NETWORK COMPONENTS	-	-	-	-	REFER TO TECHNOLOGY PACKAGE MATRIX ITEM 1.000 PREMISE DISTRIBUTION SYSTEM
1.0500	BACKBONE CABLE	-	-	-	-	REFER TO TECHNOLOGY PACKAGE MATRIX ITEM 1.000 PREMISE DISTRIBUTION SYSTEM
1.0600	HORIZONTAL CABLE	X	X	-	-	REFER TO TECHNOLOGY PACKAGE MATRIX PREMISE DISTRIBUTION SYSTEM FOR CABLING TO THE GATE PODIUM. CONTRACTOR SHALL PROVIDE ALL CABLING AND CONNECTIONS TO SPEAKERS, AMPLIFIERS AND AUDIO BRIDGE
1.0700	FIELD DEVICES	X	X	-	-	AMPLIFIERS, CONTROLLERS, MICROPHONES, SPEAKERS, AMBIENT NOISE SENSORS

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Revisions

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PAGING NOTES, LEGEND AND ABBREVIATIONS

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Drawing No.:

TP001

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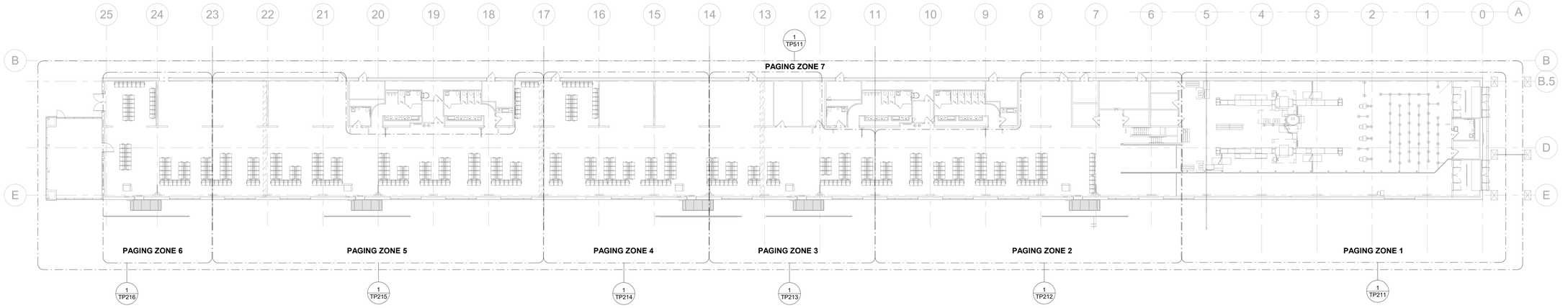

1 Level 1 - Paging
1" = 20'-0"

PAGING - ADD ALTERNATE NOTES:

1. PAGING CONTRACTOR SHALL PRICE WORK FOR ADD ALTERNATES IN AREAS AS CALLED OUT ON ARCHITECTURAL DRAWINGS AND AS DEFINED ON SHEET G211. INCLUDE MATERIALS AND LABOR COST FOR ADD ALTERNATES AS REQUIRED.
2. PAGING CONTRACTOR SHALL COORDINATE WITH ARCHITECT FOR DELINEATION AND DOCUMENTATION TO INCLUDE ADD ALTERNATES.

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407.894.1338 (FAX)
WWW.MLM-MARTIN.COM
AA-C002208
MLM JOB # TYPE PROPERTY

JOHN E. BURNS
LICENSE
No 62139
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

SEAL

Revisions

No.	Date	Description

Project No.:	Project Number
Designed By:	AB
Drawn By:	AB
Checked By:	JB
Issue Date:	30-NOV-2020
Drawing Scale:	As indicated

Drawing Title:

OVERALL FLOOR PLANS

BID DOCUMENT

Drawing No.:

TP110

BIM 360://Design of Satellite Concourse/VPS_ETSTCFA.rvt

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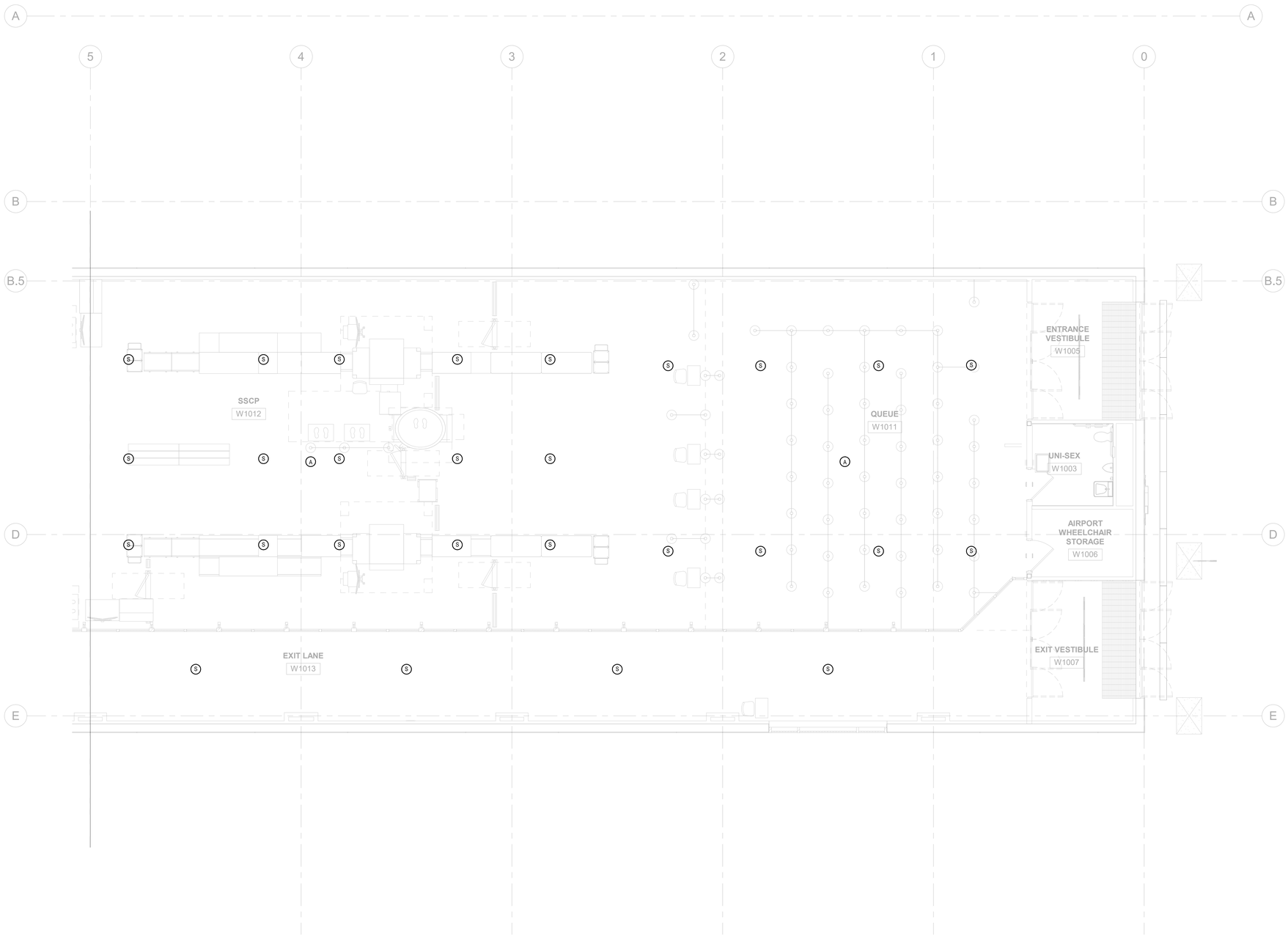

1 LEVEL 1 - PAGING - AREA 1
3/16" = 1'-0"

GENERAL NOTES

1. ALL SPEAKERS, AND EQUIPMENT SHOWN ARE DIAGRAMMATICAL IN REFERENCE TO THE FLOOR PLAN. THE DEVICES SHOWN SHALL BE INSTALLED TO REFLECT THE INTENT OF THE DRAWINGS.
2. CONTRACTOR SHALL COORDINATE WITH THE ARCHITECTURAL DRAWINGS FOR MOUNTING REQUIREMENTS.
3. COORDINATE WITH ALL OTHER TRADES AND DRAWINGS PRIOR TO INSTALLATION AND PLACEMENT OF MICROPHONES AND PAGING SPEAKERS.

KEYED NOTES:

CONTRACTOR SHALL FURNSH AND INSTALL:

1 (1) MICROPHONE AT THE THESE LOCATIONS

PAGING - ADD ALTERNATE NOTES:

1. PAGING CONTRACTOR SHALL PRICE WORK,FOR ADD ALTERNATES IN AREAS AS CALLED OUT ON ARCHITECTURAL DRAWINGS AND AS DEFINED ON SHEET G211. INCLUDE MATERIALS AND LABOR COST FOR ADD ALTERNATES AS REQUIRED.
2. PAGING CONTRACTOR SHALL COORDINATE WITH ARCHITECT FOR DELINEATION AND DOCUMENTATION TO INCLUDE ADD ALTERNATES.

C19-2811-AP
Design of Satellite Concourse 'C'

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BURNS ENGINEERING, INC | 215 979-3700
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Drawing Scale:	As indicated

Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 1

BID DOCUMENT

Drawing No.:

TP211

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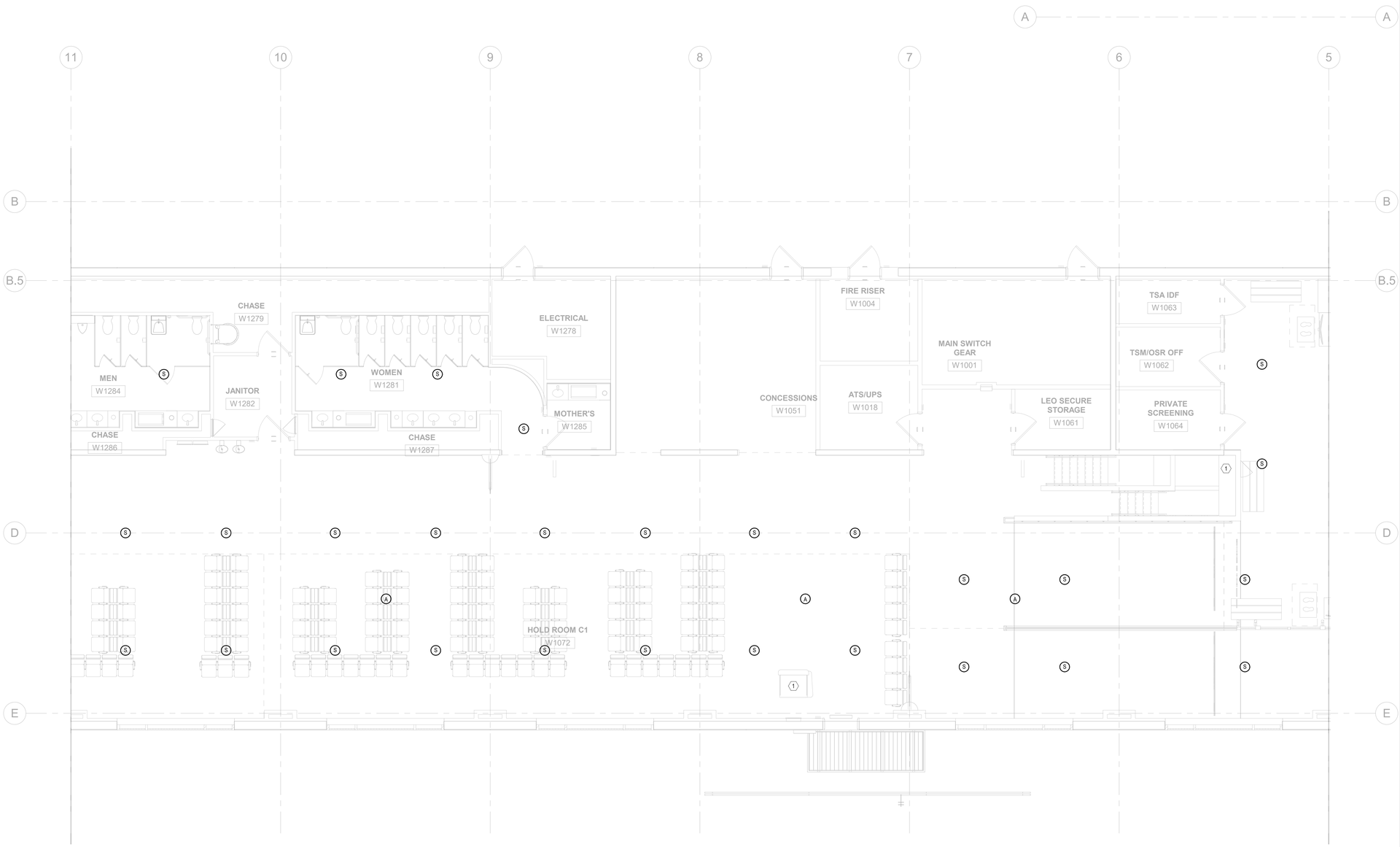

1 LEVEL 1 - PAGING - AREA 2
3/16" = 1'-0"

GENERAL NOTES

1. ALL OUTLETS AND EQUIPMENT SHOWN ARE DIAGRAMMATICAL IN REFERENCE TO THE FLOOR PLAN. THE DEVICES SHOWN SHALL BE INSTALLED TO REFLECT THE INTENT OF THE DRAWINGS.
2. CONTRACTOR SHALL COORDINATE WITH THE ARCHITECTURAL DRAWINGS FOR MOUNTING OUTLET REQUIREMENTS.
3. COORDINATE WITH ALL OTHER TRADES AND DRAWINGS PRIOR TO INSTALLATION AND PLACEMENT OF WORKSTATION OUTLETS AND EQUIPMENT.

KEYED NOTES:

CONTRACTOR SHALL FURNSH AND INSTALL:

1. (1) MICROPHONE AT THE THESE LOCATIONS

PAGING - ADD ALTERNATE NOTES:

1. PAGING CONTRACTOR SHALL PRICE WORK FOR ADD ALTERNATES IN AREAS AS CALLED OUT ON ARCHITECTURAL DRAWINGS AND AS DEFINED ON SHEET G211. INCLUDE MATERIALS AND LABOR COST FOR ADD ALTERNATES AS REQUIRED.
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Drawing Scale:	

Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 2

BID DOCUMENT

Drawing No.:

TP212

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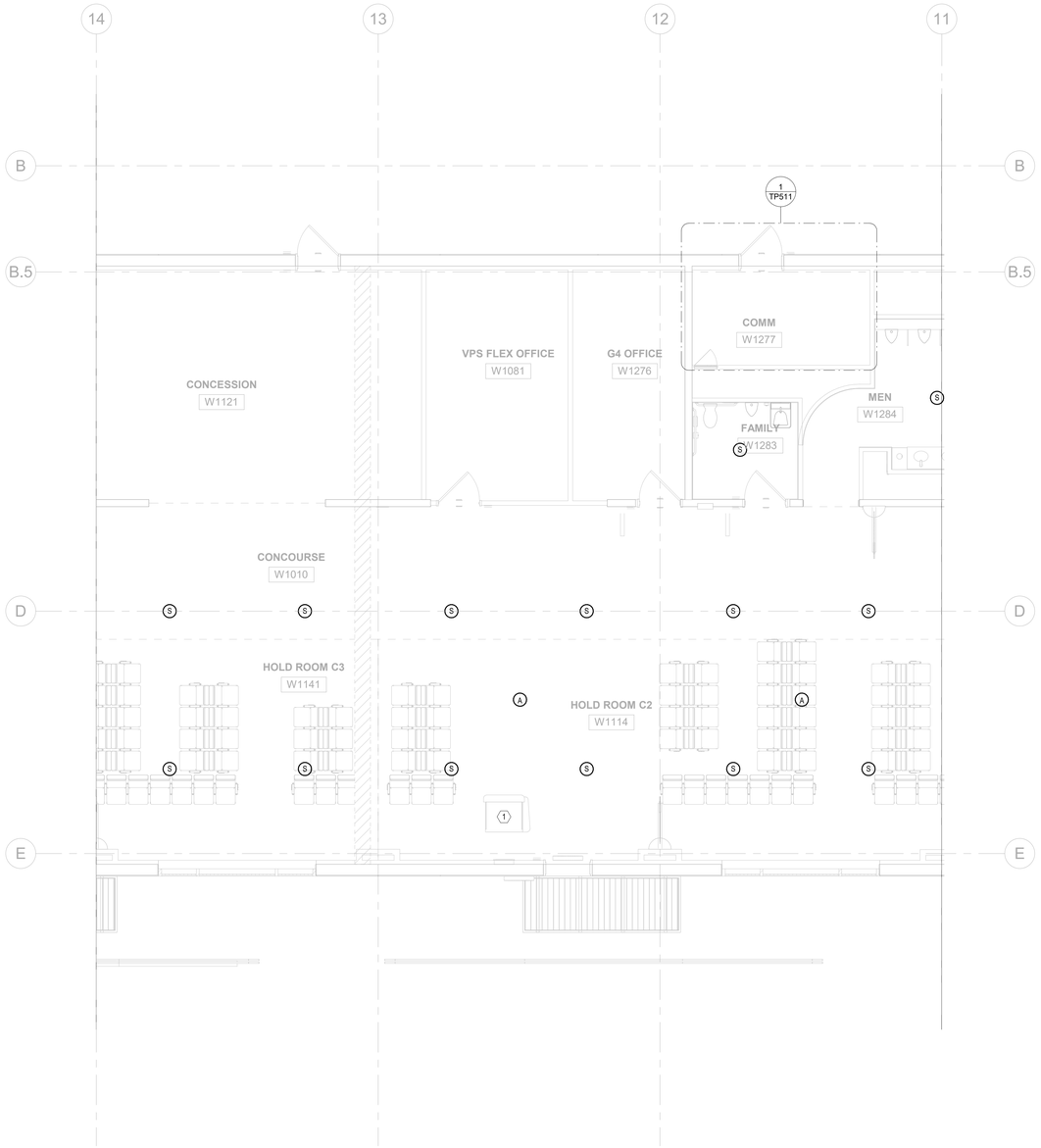

1 LEVEL 1 - PAGING - AREA 3
3/16" = 1'-0"

GENERAL NOTES

1. ALL SPEAKERS, AND EQUIPMENT SHOWN ARE DIAGRAMMATICAL IN REFERENCE TO THE FLOOR PLAN. THE DEVICES SHOWN SHALL BE INSTALLED TO REFLECT THE INTENT OF THE DRAWINGS.
2. CONTRACTOR SHALL COORDINATE WITH THE ARCHITECTURAL DRAWINGS FOR MOUNTING REQUIREMENTS.
3. COORDINATE WITH ALL OTHER TRADES AND DRAWINGS PRIOR TO INSTALLATION AND PLACEMENT OF MICROPHONES AND PAGING SPEAKERS.

KEYED NOTES:

CONTRACTOR SHALL FURNSH AND INSTALL:

1. (1) MICROPHONE AT THE THESE LOCATIONS

PAGING - ADD ALTERNATE NOTES:

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2. PAGING CONTRACTOR SHALL COORDINATE WITH ARCHITECT FOR DELINEATION AND DOCUMENTATION TO INCLUDE ADD ALTERNATES.

OKALOOSA COUNTY

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Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 3

BID DOCUMENT

Drawing No.:

TP213

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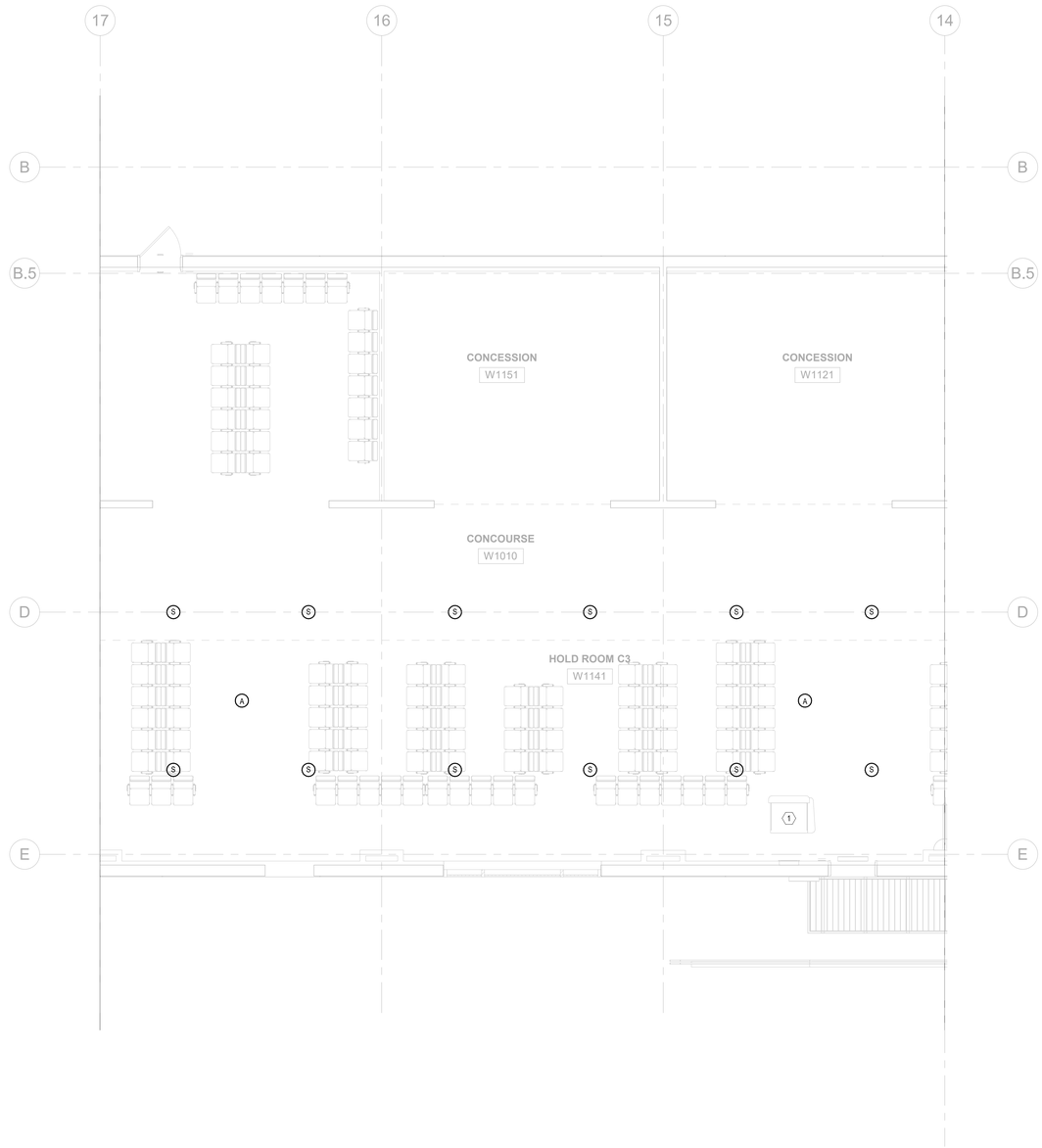

1 LEVEL 1 - PAGING - AREA 4
3/16" = 1'-0"

GENERAL NOTES

1. ALL SPEAKERS, AND EQUIPMENT SHOWN ARE DIAGRAMMATICAL IN REFERENCE TO THE FLOOR PLAN. THE DEVICES SHOWN SHALL BE INSTALLED TO REFLECT THE INTENT OF THE DRAWINGS.
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OKALOOSA COUNTY

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ENLARGED FLOOR PLAN LEVEL 1 - AREA 4

BID DOCUMENT

Drawing No.:

TP214

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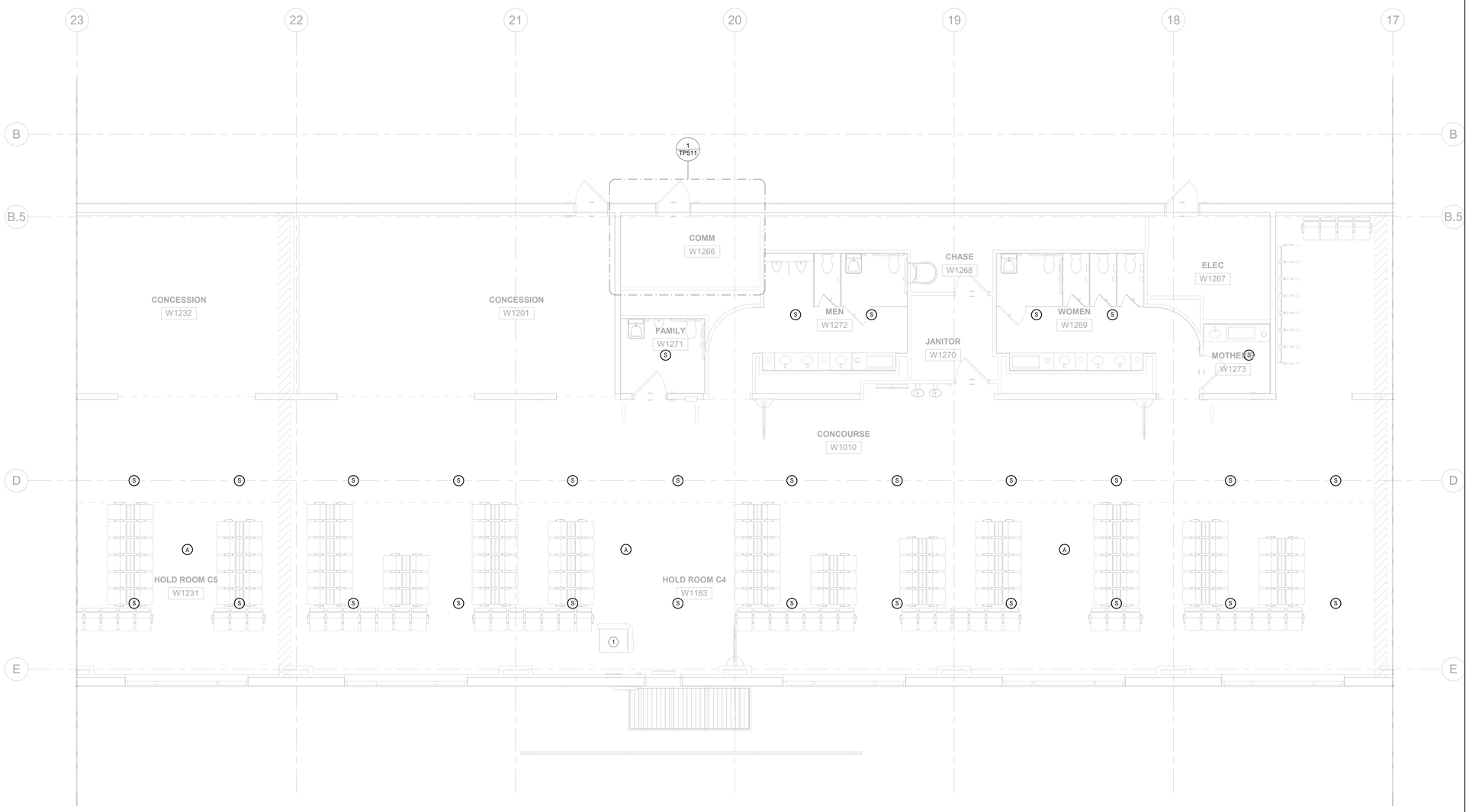

1 LEVEL 1 - PAGING - AREA 5
3/16" = 1'-0"

GENERAL NOTES

1. ALL SPEAKERS, AND EQUIPMENT SHOWN ARE DIAGRAMMATICAL IN REFERENCE TO THE FLOOR PLAN. THE DEVICES SHOWN SHALL BE INSTALLED TO REFLECT THE INTENT OF THE DRAWINGS.
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Checked By:	JB
Issue Date:	30-NOV-2020
Drawing Scale:	

Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 5

BID DOCUMENT

Drawing No.:

TP215

BIM 360://Design of Satellite Concourse/VPS_ETSTCFA.rvt

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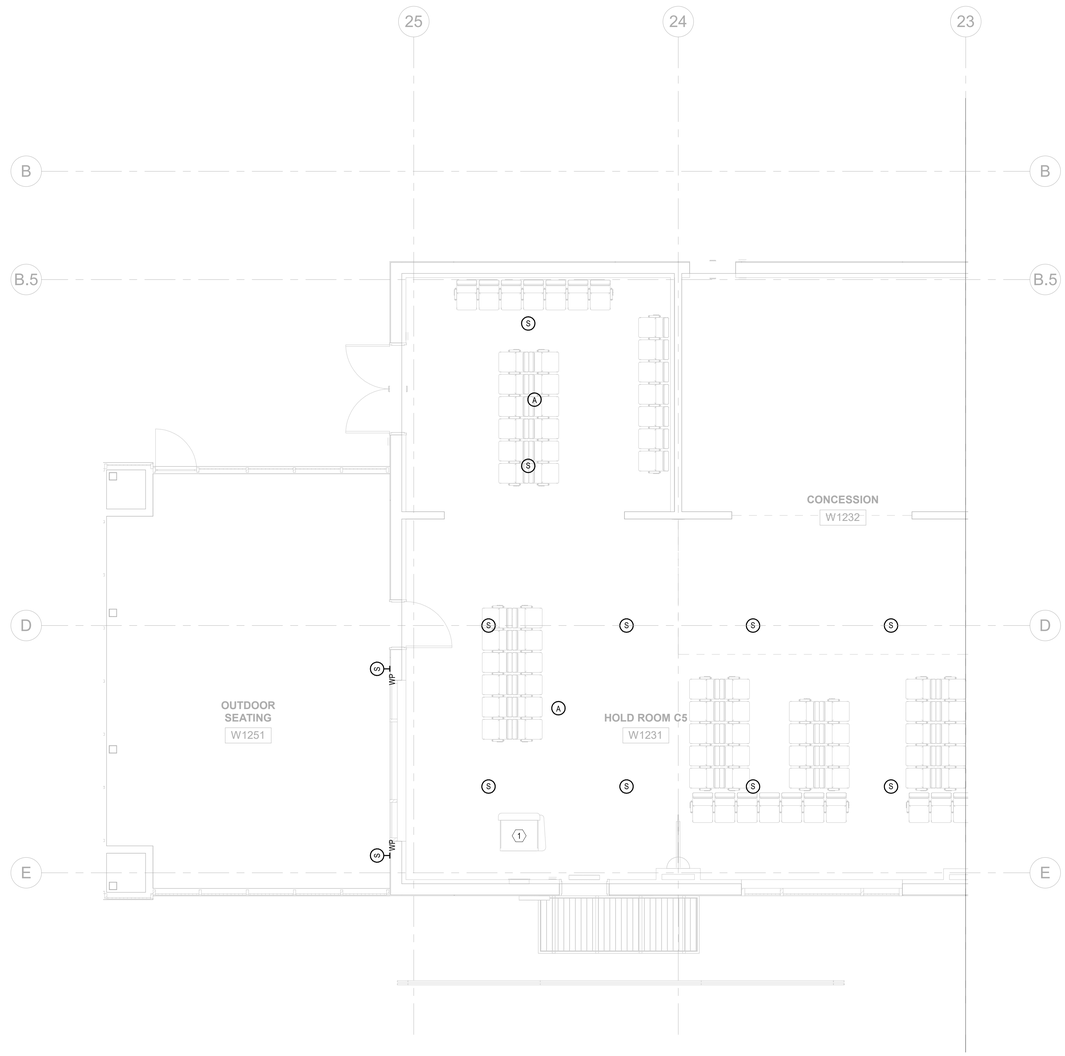

1 LEVEL 1 - PAGING - AREA 6
3/16" = 1'-0"

GENERAL NOTES

1. ALL SPEAKERS, AND EQUIPMENT SHOWN ARE DIAGRAMMATICAL IN REFERENCE TO THE FLOOR PLAN. THE DEVICES SHOWN SHALL BE INSTALLED TO REFLECT THE INTENT OF THE DRAWINGS.
2. CONTRACTOR SHALL COORDINATE WITH THE ARCHITECTURAL DRAWINGS FOR MOUNTING REQUIREMENTS.
3. COORDINATE WITH ALL OTHER TRADES AND DRAWINGS PRIOR TO INSTALLATION AND PLACEMENT OF MICROPHONES AND PAGING SPEAKERS.

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OKALOOSA COUNTY

FLY VPS

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Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 6

BID DOCUMENT

Drawing No.:

TP216

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NOTES:

1. FOR GENERAL NOTES, LEGEND, ABBREVIATIONS AND SYMBOLS, SEE DRAWING TP001.
2. RISER DIAGRAM IS DIAGRAMMATIC ONLY AND HAS BEEN PROVIDED TO DEPICT THE GENERAL ARRANGEMENT AND INSTALLATION REQUIREMENTS OF THE PUBLIC ANNOUNCEMENT (PA) SYSTEM. UNLESS OTHERWISE NOTED, ALL HEADEND PUBLIC ANNOUNCEMENT (PA) SYSTEM (PEAVEY MEDIAMATRIX) EQUIPMENT IS EXISTING. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL NECESSARY CONDUITS, CABLING, CONNECTING HARDWARE, MOUNTING HARDWARE, BACKBOXES, PULL/JUNCTION BOXES, TRENCHING/DUCTBANKS, PAGING SPEAKER MOUNTING BRACKETS, COMPONENTS, DEVICES, COMMISSIONING UNLESS OTHERWISE NOTED, AS WELL AS ALL LICENSES, ELECTRICAL POWER, GROUNDING AND APPURTENANCES AS REQUIRED TO PROVIDE FULLY OPERATIONAL SYSTEM.
3. REFER TO FLOOR PLANS FOR EXACT LOCATION AND QUANTITY OF PUBLIC ANNOUNCEMENT SPEAKERS.
4. ALL EQUIPMENT ARE NEW UNLESS OTHERWISE NOTED.

PAGING - ADD ALTERNATE NOTES:

1. PAGING CONTRACTOR SHALL PRICE WORK FOR ADD ALTERNATES IN AREAS AS CALLED OUT ON ARCHITECTURAL DRAWINGS AND AS DEFINED ON SHEET G211. INCLUDE MATERIALS AND LABOR COST FOR ADD ALTERNATES AS REQUIRED.
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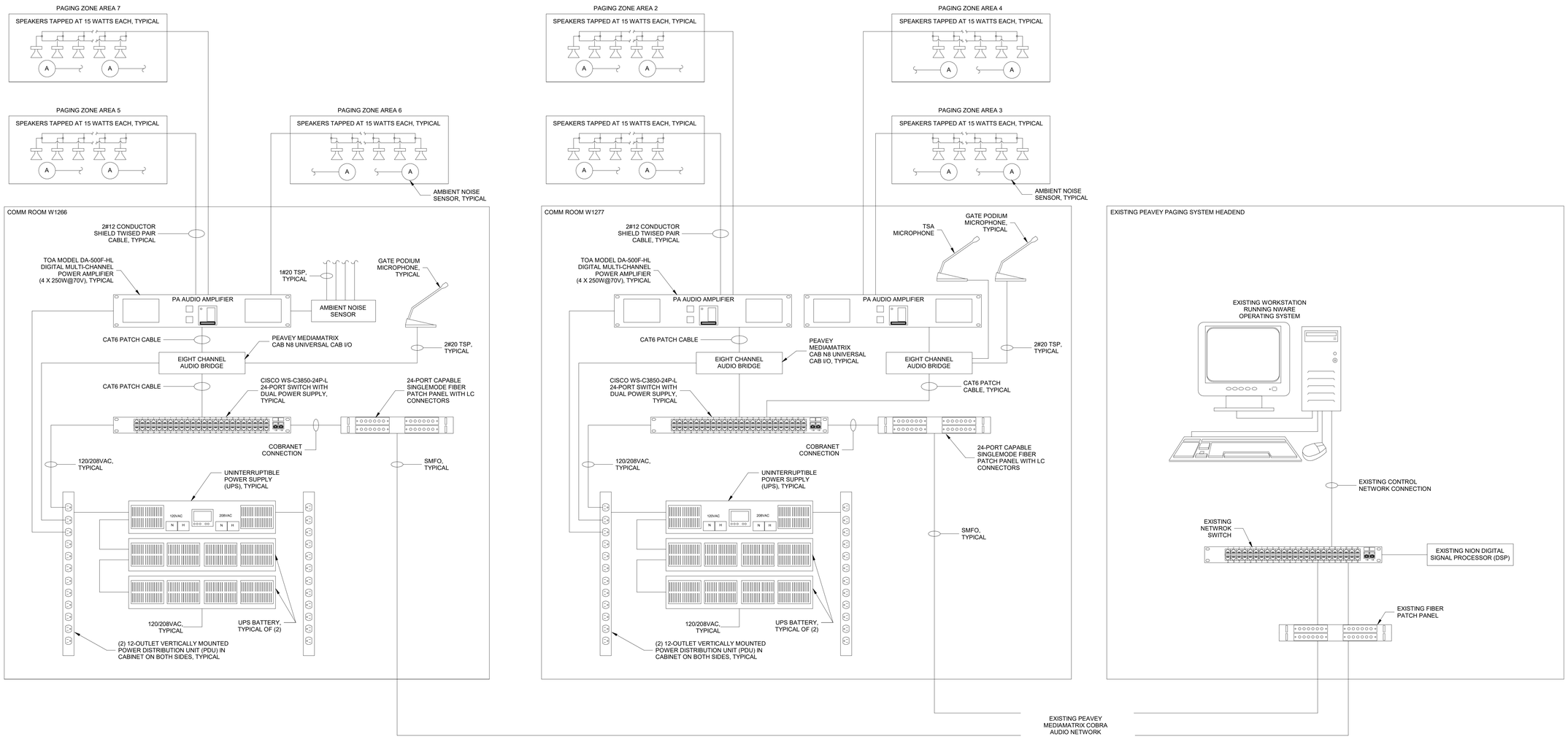

PASSENGER INFORMATION DISPLAY AND PUBLIC ANNOUNCEMENT RISER DIAGRAM
1 NONE

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Drawing Scale:	

Drawing Title:

SINGLE LINE DIAGRAM - PAGING

BID DOCUMENT

Drawing No.:

TP511

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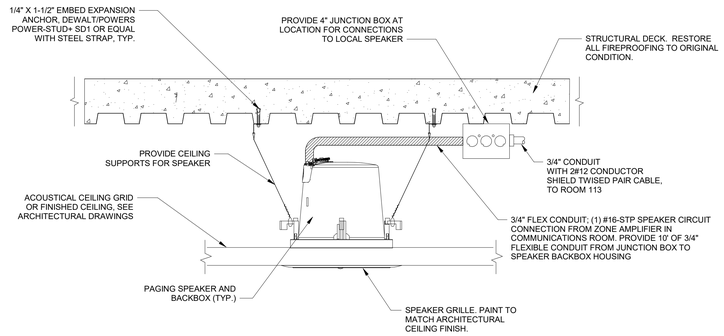
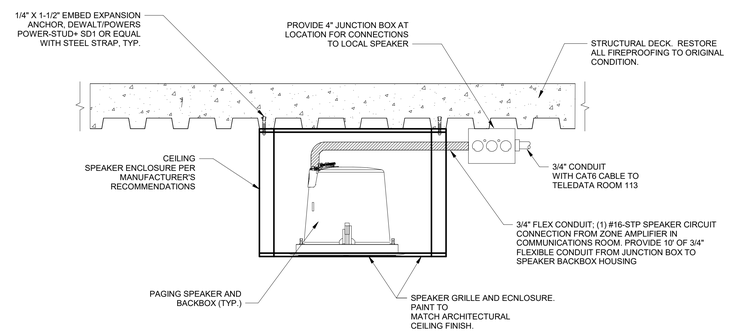
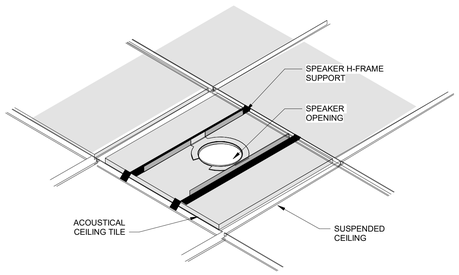


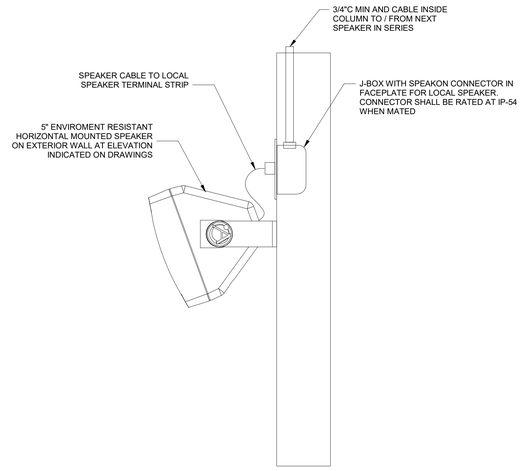
1 PA SPEAKER INSTALLATION DETAILS - FINISHED OR DROP CEILING
NONE



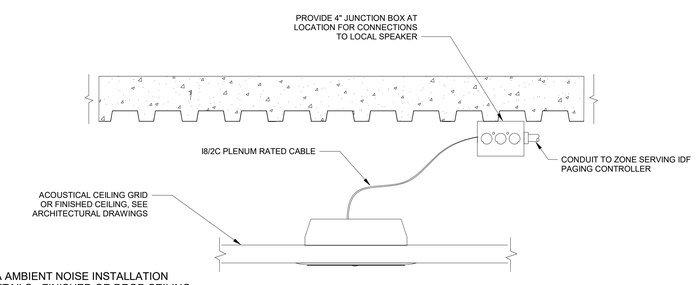
2 PA SPEAKER INSTALLATION DETAILS - STRUCTURAL CEILING
NONE



3 Airplane Top View Details
12" = 1'-0"



4 WALL MOUNT SPEAKER
1/8" = 1'-0"



5 PA AMBIENT NOISE INSTALLATION DETAILS - FINISHED OR DROP CEILING
NONE

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Drawing Title:

DETAILS - PAGING

BID DOCUMENT

Drawing No.:

TP811

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MOUNTING HEIGHTS

CEILING	SMOKE AND HEAT DETECTORS, 360° SECURITY MOTION DETECTORS, CCTV SURVEILLANCE CAMERAS, PUBLIC ADDRESS AND VOICE EVACUATION SPEAKERS, WIRELESS ACCESS POINTS. TV AND LCD PROJECTOR JACKS
8' A.F.G.	EXTERIOR VISUAL AND AUDIO/VISUAL FIRE ALARM NOTIFICATION DEVICES, EXTERIOR PUBLIC ADDRESS SPEAKERS.
7'-5" A.F.F.	CLOCKS, COMBINATION CLOCK/SPEAKERS, TRUMPET SPEAKERS
7'-0" A.F.F.	VISUAL AND AUDIO/VISUAL FIRE ALARM NOTIFICATION DEVICES, WALL MOUNTED SECURITY MOTION DETECTORS (CENTER OF DEVICE)
6" ABOVE DOOR JAMB	REQUEST TO EXIT MOTION DETECTORS
5'-6" A.F.F	TOP OF PLYWOOD TELEPHONE BACKBOARD
5'-4" A.F.F.	FIRE ALARM ANNUNCIATOR PANELS, FIRE FIGHTER CONTROL STATIONS, SECURITY ANNUNCIATOR PANELS
4'-8" A.F.G. MAX	PEDESTAL MOUNT INTERCOM PEDESTAL MOUNT CARD READER
4'-0" A.F.F.	*PS* TELEPHONE OUTLETS (TOP OF COIN SLOT),(WALL MOUNTED)-TELEPHONE INSTRUMENTS, INTERCOM STATIONS, FIRE FIGHTER TELEPHONE JACKS, FIRE ALARM MANUAL STATIONS, CARD READERS, MANUAL REQUEST TO EXIT DEVICES, WALL MOUNTED DURESS ALARM STATIONS, RESCUE ASSISTANCE PANELS, LCD KEYPADS (CENTER OF DEVICE)
UNDER COUNTER OR DESK	DURESS ALARM BUTTONS, DOOR RELEASE BUTTOMS
1'-6" A.F.F.	DATA/TELEPHONE JACKS, LOW TELEVISION JACKS, MICROPHONE JACKS
0'-0"	IN FLOOR JUNCTION BOXES FLUSH TO FINISHED FLOOR (FF) (DATA, TELEPHONE, MICROPHONE, MEDIA)

1. IN MASONRY CONSTRUCTION THE MOUNTING HEIGHTS SHALL BE USED FOR REFERENCE TO THE NEAREST BLOCK OR BRICK COURSING.
2. THE ABOVE MOUNTING ELEVATIONS ARE TO CENTER OF DEVICE AND SHALL BE ADHERED TO UNLESS SPECIFICALLY NOTED OR DETAILED OTHERWISE ON THE DRAWINGS AND/OR SPECIFICATIONS.
3. COORDINATE THE INSTALLATION AND MOUNTING ELEVATIONS OF ALL EQUIPMENT, DEVICES, CONTROLS AND APPURTENANCES WITH ARCHITECT AND ALL AFFECTED TRADES PRIOR TO INSTALLATION. DOCUMENT ALL MOUNTING ELEVATIONS FOR ALL EQUIPMENT, DEVICES, CONTROLS AND APPURTENANCES AT THE TIME OF SHOP DRAWING SUBMITTAL

SECURITY ABBREVIATIONS

A/AMP	AMPERE
AC	ALTERNATING CURRENT
ACR	ATTENUATION/CROSSTALK RATIO
ACS	ACCESS CONTROL SYSTEM
ADJ	ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AL	ALUMINUM
AM	AMMETER
APPROX	APPROXIMATELE(LY)
ASY	ASYMETRIC
ATS	AUTOMATIC TRANSFER SWITCH
AWG	AMERICAN WIRE GAUGE
BATT	BATTERY
BFC	BELOW FINISHED CEILING
BKR	BREAKER
BLDG	BUILDING
BLK	BLACK
BRKT	BRACKET
C	CONDUIT
CAB	CABINET
CATV	CABLE TELEVISION
CB	CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TELEVISION
cd	CANDELA
CIR/CKT	CIRCUIT
CLF	CURRENT LIMITING FUSE
CLG	CEILING
CLR	CLEAR
COL	COLUMN
COMM	COMMUNICATION
CT	CURRENT TRANSFORMER
CU	COPPER
DAS	DISTRIBUTED ANTENNA SYSTEM
dB	DECIBEL
DC	DIRECT CURRENT
DE	DUAL ELEMENT
DED	DEDICATED
DIA	DIAMETER
DIB	DUAL READER DOOR INTERFACE BOX
DISC	DISCONNECT
DNLT	DOWNLIGHT
DP	DISTRIBUTION PANEL
DPDT	DOUBLE POLE DOUBLE-THROW
DWG	DRAWING
EA	EACH
EC	ELECTRICAL CONTRACTOR
EF	EXHAUST FAN
EIA	ELECTRONICS INDUSTRY ASSOCIATION
ELEC	ELECTRICAL
ELEV	ELEVATOR
EMERG	EMERGENCY
EO	ELECTRICALLY OPERATED
EQIP	EQUIPMENT
ESB	ENERGY SAVING BALLAST
EWC	ELECTRIC WATER COOLER
FA	FIRE ALARM
FAA	FIRE ALARM ANNUNCIATOR
FAAP	FIRE ALARM ANNUNCIATOR PANEL
FACP	FIRE ALARM CONTROL PANEL
FAGP	FIRE ALARM GRAPHIC ANNUNCIATOR PANEL
FEXT	FAR END CROSSTALK
FIXT	FIXTURE
FL	FLOOR
FLA	FULL LOAD AMPERES
FLOUR	FLUORESCENT
FT	FOOTCANDLES
FVNR	FULL VOLTAGE NON-REVERSING
GC	GENERAL CONTRACTOR
GEN	GENERATOR
GFI	GROUND FAULT INTERRUPTER
GND/G	GROUND
HH	HAND HOLE
HID	HIGH INTENSITY DISCHARGE
HP	HORSEPOWER
HPF	HIGH POWER FACTOR
HV	HIGH VOLTAGE
HVAC	HEATING VENTILATING AIR CONDITIONING
HZ	HERTZ
IG	ISOLATED GROUND
INCAN	INCANDESCENT
IPS	INVERTER POWER SUPPLY
JB	JUNCTION BOX
KVA	KILOVOLT AMPERE
KVAR	KILOVAR (REACTANCE)
KW	KILOWATT
KWH	KILOWATT HOUR METER
LA	LIGHTNING ARRESTER
LED	LIGHT EMITTING DIODE
LT	LIGHT
LTG	LIGHTING
LV	LOW VOLTAGE
MATV	MASTER ANTENNA TELEVISION
MC	MECHANICAL CONTRACTOR
MCB	MAIN CIRCUIT BREAKER
MCC	METAL-CLAD CABLE
MCC	MOTOR CONTROL CENTER
MCP	MOTOR CIRCUIT PROTECTOR
MDP	MAIN DISTRIBUTION PANEL
MFR	MANUFACTURER
MH	MANHOLE
MH	METAL HALIDE
MISC	MISCELLANEOUS
MM	MILLIMETER
MTD	MOUNTED
MTG HT	MOUNTING HEIGHT
MTS	MANUAL TRANSFER SWITCH
MV	MILLIVOLT
MV	MEDIUM VOLTAGE
N/A	NOT AVAILABLE/NOT APPLICABLE
NEC	NATIONAL ELECTRIC CODE
NEMA	NATIONAL ELECTRIC MFR ASSOCIATION
NEXT	NEAR END CROSSTALK
NFPA	NATIONAL FIRE PROTECTION ASSOCIATION
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT
NO	NORMALLY OPENED
NTS	NOT TO SCALE
OC	ON CENTER
OH	OVERHEAD
OL	OVERLOAD HEATER ELEMENT
P	POLE
PB	PULL BOX
PLY	PLYWOOD
PNL	PANEL
PP	POWER PANEL
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHORIDE
RECPT	RECEPTACLE
REFL	REFLECTOR
REQ	REQUIRED
RGS	RIGID GALVANIZED STEEL CONDUIT
RO	ROUGH IN ONLY
RM	ROOM
SCH	SCHEDULE
SPDT	SINGLE POLE SINGLE THROW
SPST	SINGLE POLE DOUBLE THROW
SSB	SOLID STATE BALLAST
SW	SWITCH
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
TELE	TELEPHONE
TIA	TELECOMMUNICATIONS INDUSTRY ASSOCIATION
TSB	TECHNICAL SERVICE BULLETIN
TSP	TWISTED SHIELDED PAIR
TYP	TYPICAL
UL	UNDERWRITER'S LABORATORIES
UON	UNLESS OTHERWISE NOTED
UPS	UNINTERRUPTABLE POWER SUPPLY
UTP	UNSHIELDED TWISTED PAIR
V	VOLT
VM	VOLTMETER
VP	VAPOR PROOF
W	WATT
W/	WITH
W/I	WITHIN
W/O	WITHOUT
WAP	WIRELESS ACCESS POINT
WP	WEATHERPROOF
WW	WARM WHITE
XFMR	TRANSFORMER
XP	EXPLOSION PROOF

GENERAL SECURITY SYSTEM NOTES:

1. THE FOLLOWING GENERAL NOTES AS LISTED BELOW SHALL APPLY TO ALL ELECTRONIC SECURITY SYSTEM REQUIREMENTS AS INDICATED ON ALL TS SERIES CONTRACT DRAWINGS.
2. THE EXTENT OF THE ELECTRONIC SECURITY WORK FOR THIS PROJECT SHALL CONSIST OF THE GENERAL CONTRACTOR PROVIDING ALL CABLING, CONDUITS, BACKBOXES, DEVICES, COMPONENTS, ACTIVE ELECTRONICS, PROCESSORS, SERVERS, DOOR HARDWARE AND APPURTENANCES NECESSARY TO SUPPORT THE COMPLETE INSTALLATION OF BOTH ELECTRONIC ACCESS CONTROL AND VIDEO SURVEILLANCE SYSTEMS IN ACCORDANCE WITH THE CONTRACT DRAWINGS. REFER TO RELATED DIVISION SPECIFICATION SECTIONS FOR ADDITIONAL INFORMATION.
3. THE COMMUNICATIONS EQUIPMENT ROOM SHALL BE A SHARED SPACE BETWEEN THE ELECTRONIC SECURITY AND THE DATA/TELECOMMUNICATIONS SYSTEMS. IT SHALL BE THE RESPONSIBILITY OF ALL CONTRACTORS TO COORDINATE WITH ALL AFFECTED TRADES FOR PROPER EQUIPMENT SPACE REQUIREMENTS. ALL CONTRACTORS SHALL DEMONSTRATE AT THE TIME OF SHOP DRAWING SUBMISSION THAT THE COORDINATION BETWEEN ALL AFFECTED TRADES HAS MET ALL COORDINATION REQUIREMENTS.
4. DUE TO SCALE OF THE DRAWINGS, ALL SECURITY SYSTEM EQUIPMENT SYMBOLS ARE SHOWN ON DRAWINGS AS CLOSE AS POSSIBLE TO THEIR INTENDED LOCATION. CONTRACTOR SHALL COORDINATE IN THE FIELD THE PROPER INSTALLATION OF ALL EQUIPMENT, DEVICES, CONTROLS, CONDUITS AND CABLING. REFER TO RELATED SPECIFICATION SECTIONS FOR ADDITIONAL REQUIREMENTS.
5. THE CONTRACTOR SHALL COORDINATE WITH ALL AFFECTED TRADES ANY CONDITIONS RELATED TO THE PROPER INSTALLATION OF ALL SYSTEMS. COORDINATION SHALL BE BETWEEN ALL APPROPRIATE TRADES REGARDING ALL INSTALLATION REQUIREMENTS IMPACTING THE PLACEMENT OF ALL SYSTEM CONDUITS, HARDWARE AND COMPONENTS TO THE SATISFACTION OF ALL CONCERNED TRADES.
6. COORDINATE EXACT LOCATION OF ALL DESK OR COUNTER MOUNTED EQUIPMENT WITH OWNER AND ARCHITECT AND ALL AFFECTED TRADES PRIOR TO THE INSTALLATION OF ANY EQUIPMENT AND/OR CABLING.
7. COORDINATE EXACT LOCATION(S) OF ALL CEILING MOUNTED CABLE, CONDUITS, EQUIPMENT AND/OR DEVICES WITH ALL ARCHITECTURAL PLANS, REFLECTED CEILING PLANS AND ALL AFFECTED TRADES PRIOR TO INSTALLATION.
8. CCTV CAMERAS SHALL BE INSTALLED IN SUCH MANOR THAT ALL SURVEILLANCE VIEWS SHALL BE FREE FROM ALL OBSTRUCTIONS IN ORDER TO PROVIDE UNRESTRICTED VIEWING ANGLES.
9. CCTV CAMERAS INSTALLED IN AREAS WITH NON-FINISHED CEILINGS SHALL BE MOUNTED DIRECTLY TO WALLS, STRUCTURAL SUPPORTS OR THE UNDERSIDE OF ROOF DECK OF THE FACILITY. NO CAMERAS SHALL BE MOUNTED TO ANY PIPING AND/OR CONDUITS OR BLOCK ANY ACCESS HATCH'S, EQUIPMENT OR ENTRANCES. COORDINATE WITH ALL AFFECTED TRADE CONTRACTORS PRIOR TO INSTALLATION.
10. ALL INTERIOR CCTV CAMERAS SHALL BE INSTALLED IN LOW PROFILE, MINIMUM FOOTPRINT DETECTION GRADE TYPE ENCLOSURES AND SHALL BE INSTALLED BASED ON THE OPTIMUM CAMERA PLACEMENT TO OBTAIN THE MAXIMUM VISIBLE SURVEILLANCE OF THE AREA AS INDICATED ON THE CONTRACT DRAWINGS. COORDINATE EACH CAMERA LOCATION WITH REFLECTED CEILING PLANS AND AFFECTED TRADES PRIOR TO INSTALLATION. REVIEW ALL SURVEILLANCE COVERAGE AREAS AND ALARM PRE-SETS WITH OWNER AND ARCHITECT PRIOR TO FINAL PROGRAMMING.
11. ALL EXTERIOR CAMERAS SHALL BE RATED FOR THE ENVIRONMENTAL APPLICATION AND BE PROVIDED AS, PENDANT, POLE, PARAPET OR WALL MOUNTED DOME HOUSINGS AS INDICATED. ALL EXTERIOR CAMERAS SHALL BE MEET IP65 (NEMA 4) SEALING REQUIREMENTS AND SHALL BE SUPPLIED WITH AN INTERNAL HEATER AND BLOWER. ALL EXTERIOR CAMERAS SHALL BE INSTALLED BASED ON THE OPTIMUM CAMERA PLACEMENT TO OBTAIN THE MAXIMUM VISIBLE SURVEILLANCE OF THE AREA AS INDICATED ON THE CONTRACT DRAWINGS. REVIEW ALL SURVEILLANCE COVERAGE AREAS AND ALARM PRE-SETS WITH OWNER AND ARCHITECT PRIOR TO FINAL PROGRAMMING.
12. ALL SECURITY SYSTEM CABLING SHALL BE INSTALLED IN DEDICATED CONDUITS PROVIDED BY THE GENERAL CONTRACTOR. ALL CONDUITS SHALL BE SIZED AND INSTALLED IN ACCORDANCE WITH NFPA 70 AND RELATED PROJECT SPECIFICATIONS. COORDINATE WITH THE ESS INTEGRATOR PRIOR TO INSTALLATION. ALL CONDUITS SHALL BE A MINIMUM OF 3/4" UNLESS OTHERWISE NOTED.
13. ALL CONDUITS/RACEWAYS SHALL BE INSTALLED IN A MANNER THAT PREVENTS TAMPERING OR REMOVAL WHEN INSTALLED IN AREAS EXPOSED TO THE GENERAL POPULATION. PROVIDE TAMPER-RESISTANT INSTALLATION UTILIZING "TORX WITH PEG" SECURITY-FASTENING DEVICES FOR ALL CONDUITS/RACEWAYS, EQUIPMENT, DEVICES AND APPURTENANCES IN ALL AREAS ACCESSIBLE TO THE GENERAL POPULATION AND/OR AREAS SUBJECTED TO TAMPERING OR VANDALISM.
14. ALL CCTV SURVEILLANCE CAMERA CABLING SHALL BE CATEGORY 6A UTP INSTALLED IN DEDICATED CONDUITS AND TERMINATED AT THE APPROPRIATE COMMUNICATIONS EQUIPMENT RACKS. ALL CCTV CONDUITS SHALL NOT CONTAIN ANY DATA, TELEPHONE OR AC CONDUCTING CABLING. ALL CCTV CABLE RUNS SHALL NOT EXCEED 295' FROM PATCH PANEL TO CAMERA TERMINATION AND SHALL BE TESTED AND CERTIFIED IN ACCORDANCE WITH ALL REQUIREMENTS OF THE CONTRACT DOCUMENTS. REFER TO RELATED DIVISION 27 SPECIFICATIONS SECTIONS FOR ADDITIONAL INFORMATION RELATED TO THE INSTALLATION AND TESTING OF CATEGORY 6 CABLING .
15. ALL SYSTEM WIRING, CONDUITS AND EQUIPMENT INSTALLATION SHALL BE IN ACCORDANCE WITH GOOD ENGINEERING PRACTICES AND BY ALL IEEE, EIA, NEC AND MANUFACTURER'S REQUIREMENTS. ALL WIRING SHALL COMPLY WITH ALL STATE AND LOCAL ELECTRICAL CODES AND SHALL TEST FREE FROM ALL GROUNDS, SHORTS STRAY VOLTAGES AND EMI.
16. PROVIDE ALL EQUIPMENT CLEARANCES IN ACCORDANCE WITH NEC REQUIREMENTS. ARRANGE EQUIPMENT TO FACILITATE UNRESTRICTED ACCESS FOR MAINTENANCE AND SERVICE AROUND ALL EQUIPMENT, COMPONENTS AND/OR CABLE TERMINATIONS.
17. PROPERLY GROUND ALL EQUIPMENT, RACKS, CABINET'S, CONDUITS AND CABLE SHIELDS IN ACCORDANCE WITH ALL REQUIREMENTS OF THE NFPA 70 AND EQUIPMENT MANUFACTURER. ALL EXTERIOR CCTV CAMERAS SHALL BE PROPERLY SURGE PROTECTED AND GROUNDED TO MINIMIZE DAMAGE DUE TO LIGHTENING STRIKES, SNEAK CURRENTS AND OTHER TRANSIENT VOLTAGE SPIKES. ALL SURGE PROTECTION AND GROUNDING SHALL BE IN ACCORDANCE WITH ALL REQUIREMENTS OF THE EQUIPMENT MANUFACTURER. NEC, IEEE AND TIA/EIA.
18. WHERE EQUIPMENT AND/OR JUNCTION BOXES ARE INSTALLED ABOVE FINISHED CEILINGS, THE CONTRACTOR SHALL PROVIDE ACCESS HATCHES LISTED FOR THE INTENDED APPLICATION. ACCESS HATCHES SHALL BE LOCATED SO THAT SERVICE ACCESS TO THE EQUIPMENT AND/OR JUNCTION BOXES IS UNIMPEDED.
19. ALL PENETRATIONS OF WALLS AND/OR FLOORS SHALL BE FIRE STOPPED IN ACCORDANCE WITH THE ASTM AND NFPA REQUIREMENTS. REFER TO RELATED SPECIFICATION SECTIONS FOR ADDITIONAL INFORMATION. INSTALLATION OF FIRE-STOPS SHALL BE PERFORMED BY AN APPLICATOR/INSTALLER QUALIFIED AND TRAINED BY THE MANUFACTURER. INSTALLATION SHALL BE PERFORMED IN STRICT ACCORDANCE WITH MANUFACTURER'S DETAILED INSTALLATION PROCEDURES.
20. PROVIDE THE PROPER INTERFACE TO THE BUILDING FIRE ALARM SYSTEM AS REQUIRED BY APPLICABLE LIFE SAFETY CODES. COORDINATE WITH THE FIRE ALARM SYSTEM PROVIDER FOR PROPER SYSTEM INTEGRATION REQUIREMENTS.
21. ALL EQUIPMENT ENCLOSURES LOCATED OUTSIDE OR IN ALL AREAS WITH HIGH MOISTURE OR A RELATIVE HUMIDITY OF 75% OR GREATER SHALL BE NEMA 4X STAINLESS STEEL AND RATED FOR THAT APPLICATION.
22. ALL DEVICES, COMPONENTS OR EQUIPMENT INSTALLED ON THE EXTERIOR OF THE FACILITY SHALL BE PROVIDED IN ACCORDANCE WITH ALL MANUFACTURERS' REQUIREMENTS TO ENSURE THE PROPER OPERATION WHEN EXPOSED TO THE ENVIRONMENTAL CONDITIONS AND/OR AVERAGE ANNUAL LOWEST TEMPERATURE THAT CAN BE ANTICIPATED FOR THE GEOGRAPHIC REGION OF THE FACILITY.
23. ALL INTERIOR AND/OR EXTERIOR COMPONENTS, DEVICES OR SYSTEMS EQUIPMENT EXPOSED TO THE GENERAL POPULATION SHALL BE INSTALLED IN SECURED EQUIPMENTENCLOSURES WITH TAMPER SWITCHES AND INSTALLED IN SUCH A MANNER THAT RESISTS TAMPERING AND/OR REMOVAL WITHOUT THE USE OF SPECIALIZED TOOLS.
24. FOR EQUIPMENT INSTALLATIONS REQUIRING COORDINATION WITH OTHER TRADES THE CONTRACTOR SHALL PROVIDE ALL TEMPLATES, BACKBOXES AND EQUIPMENT ANCHOR BOLTS FOR MOUNTING OR FLUSH MOUNTING PREPARATION, (E.G. PEDESTALS OR OTHER DEVICES REQUIRING MOUNTING ON WALLS, CONCRETE PADS OR OTHER MATERIALS). COORDINATE DELIVERY OF TEMPLATES AND EQUIPMENT WITH ALL AFFECTED CONTRACTORS.
25. ALL CONTROL EQUIPMENT MUST HAVE TRANSIENT PROTECTION TO COMPLY WITH UL AND NFPA 70 REQUIREMENTS. WHERE ANY CIRCUITS LEAVE THE BUILDING, ADDITIONAL TRANSIENT PROTECTION MUST BE PROVIDED FOR EACH CIRCUIT. ALL TRANSIENT PROTECTION DEVICES MUST BE UL LISTED UNDER STANDARD # 497B (ISOLATED LOOP PROTECTORS).
26. REFER TO SPECIFICATION SECTION 280500 AS WELL AS ALL RELATED SPECIFICATION SECTION FOR PROJECT SUBMITTAL REQUIREMENTS AND ADDITIONAL INFORMATION.

ELECTRONIC SECURITY SYMBOL LEGEND

A111	DOOR NUMBER
XX.YYYY	ACCESS CONTROLLED ENTRYWAY/DOOR —INSTALLATION DETAIL TYPE —ARCHITECTURAL DOOR NUMBER UNSECURED SIDE SECURED SIDE
CR XX	PROXIMITY TYPE CARD READER P = PEDESTAL MOUNT M = MULLION MOUNT BM - BIOMETRIC READER
C	CONNECTION TO MAGNETIC DOOR POSTION SWITCH
L XX	CONNECTION TO REMOTE ELECTRONIC LOCK, LOCK POSITION SWITCH AND DOOR POSITION SWITCH A = ACTIVE DOOR - CONTROLLED BY CARD READER S = STATIC DOOR - REMOTELY CONTROLLED BY ACS
M X	CONNECTION TO MOTORIZED DOOR (OVERHEAD/SLIDING), LOCK POSITION SWITCH AND DOOR POSITION SWITCH
RX	CONNECTION TO "REQUEST TO EXIT" DEVICES (ASSOCIATED WITH ACCESS CONTROLLED DOORS ONLY)
P	PANIC BUTTON
S	SECURITY SIREN & WEATHERPROOF ENCLOSURE
XX	DOME CAMERA - FIXED XX = CAMERA NUMBER (TYPICAL) MP = MEGAPIXEL CAMERA
PTZ XX	DOME CAMERA - PAN, TILT, ZOOM XX = CAMERA NUMBER (TYPICAL)
XXX	DOME CAMERA - EXTERIOR W/ HEATER & BLOWER XX = CAMERA NUMBER (TYPICAL) MP = MEGAPIXEL CAMERA
XXX PTZ	PAN TILT ZOOM DOME CAMERA - EXTERIOR W/ HEATER & BLOWER XX = CAMERA NUMBER (TYPICAL)
CXXX.XXX	TYPICAL CAMERA DESIGNATIONS WHEN INDICATED CAMERA TYPE CAMERA NUMBER FLOOR/WING CAMERA E= EXISTING (WHEN INDICATED)
PS	24V DOOR POWER SUPPLY
APS	AUXILIARY POWER SUPPLY 24 VDC
CPS	CAMERA PWR SUPPLY 24 VAC

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Revisions

No.	Date	Description

Project No.:	Project Number
Designed By:	AB
Drawn By:	AB
Checked By:	JB
Issue Date:	30-NOV-2020
Drawing Scale:	

Drawing Title:

SECURITY NOTES, LEGEND AND ABBREVIATIONS

BID DOCUMENT

Drawing No.:

TS001

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ITEM	SYSTEM	CONTRACTOR		OWNER (AUTHORITY)		NOTES
		FURNISH	INSTALL	FURNISH	INSTALL	
1.0000	**DIVISION 28: PHYSICAL ACCESS CONTROL SYSTEM (PACS)**					
1.0100	PACS SOFTWARE LICENSES	-	-	X	X	SIEMENS (EXISTING SYSTEM)
1.0200	CONNECTION TO EXISTING SYSTEM (PANELS, DEVICES, POWER SUPPLIES)	X	X	-	-	NEW ACCESS CONTROL PANELS INSTALLED IN THE IDF TO SERVE CONCOURSE C.
1.0300	PACS SOFTWARE PROGRAMMING	X	X	-	-	
1.0400	PACS ALARM AND BADGING WORKSTATIONS	X	X	-	-	
1.0500	INTERFACES (FAS, BHS, ELEVATOR, AND DOOR CONTROLLERS)	X	X	-	-	
1.0600	INTERFACE TO VSS VIA PSIM (ADDITIONAL SITUATOR DOOR LICENSES)	X	X	-	-	
1.0700	INTERFACE TO IDS (ALARM MONITORING)	X	X	-	-	
1.0800	NETWORK COMPONENTS	-	-	-	-	REFER TO TELECOMM RESPONSIBILITY MATRIX DIV 27. CONTRACTOR SHALL BE RESPONSIBLE FOR INTEGRATION OF THE NEW ACCESS CONTROL PANEL TO EXISTING SYSTEM.
1.0900	BACKBONE CABLE	X	X	-	-	REFER TO TELECOMM RESPONSIBILITY MATRIX DIV 27
1.10	HORIZONTAL CABLE AND NETWORK PATCH CORDS	X	X	-	-	REFER TO TELECOMM RESPONSIBILITY MATRIX DIV 27
1.1100	DOOR HARDWARE - DIVISION 8	X	X	-	-	
1.1200	PACS DOOR DEVICES - READERS, AV ALARM DEVICES, AND LASER DETECTORS	X	X	-	-	
1.13a	DURESS BUTTON - OWNER	X	X	-	-	
1.13b	DURESS ALARM COMPONENTS (BUTTON, KEYSWITCH, AV DEVICE) - CBP	X	X	-	-	
1.13c	DURESS BUTTON - TSA	X	X	-	-	
1.1400	EXIT LANE PORTAL INTERFACE - BYPASS, CONTROL, AND ALARM LOGGING	X	X	-	-	
2.0000	**DIVISION 28: VIDEO SURVEILLANCE SYSTEM (VSS)**					
2.0100	NETWORK VIDEO STORAGE	-	-	X	X	EXISTING SYSTEM. CONTRACTOR SHALL COORDINATE WITH OWNER FOR ALLOCATED STORAGE DRIVES.
2.0200	VSS SOFTWARE LICENSES			X	X	ALL LICENCES SHALL BE BY OWNER.
2.0300	HEADEND SERVERS AND/OR MODIFICATIONS	-	-	X	X	
2.0400	VSS VIEWING WORKSTATIONS AND MONITORS	X	X	X	X	CONTRACTOR SHALL PROVIDE TWO (2) PC WORKSTATIONS FOR TSA VIEWING.
2.0500	PROGRAMMING TO EXISTING VSS SYSTEM	X	X	-	-	SUPERVISION BY OWNER
2.0600	INTERFACE TO PACS VIA PSIM (ADDITIONAL SITUATOR CAMERA LICENSES)	X	X	-	-	
2.0700	NETWORK COMPONENTS	-	-	-	-	REFER TO TELECOMM RESPONSIBILITY MATRIX DIV 27 ITEM 1.0000
2.0800	BACKBONE CABLE			-	-	REFER TO TELECOMM RESPONSIBILITY MATRIX DIV 27 ITEM 1.0000
2.0900	HORIZONTAL CABLE AND NETWORK PATCH CORDS	X	X	-	-	REFER TO TELECOMM RESPONSIBILITY MATRIX DIV 27 ITEM 1.0000
2.11	FIELD DEVICES (CAMERAS, MICROPHONES, CONVERTORS AND BRACKETS)	X	X	-	-	

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SECURITY RESPONSIBILITY MATRIX

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Drawing No.:

TS002

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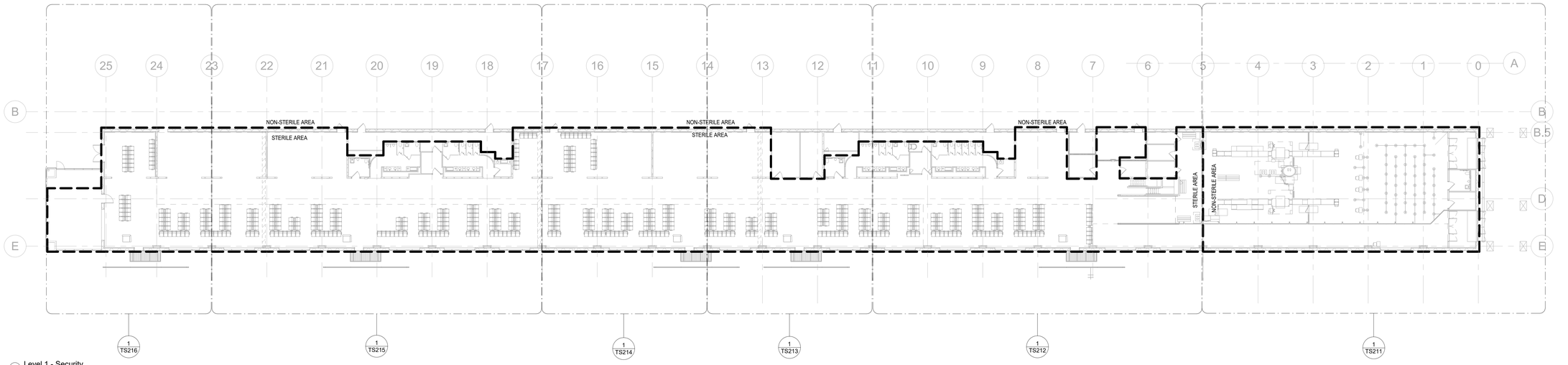

1 Level 1 - Security
1" = 20'-0"

SECURITY - ADD ALTERNATE NOTES:

1. SC CONTRACTOR SHALL PRICE WORK FOR ADD ALTERNATES IN AREAS AS CALLED OUT ON ARCHITECTURAL DRAWINGS AND AS DEFINED ON SHEET G211. INCLUDE MATERIALS AND LABOR COST FOR ADD ALTERNATES AS REQUIRED.
2. SC CONTRACTOR SHALL COORDINATE WITH ARCHITECT FOR DELINEATION AND DOCUMENTATION TO INCLUDE ADD ALTERNATES.

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Drawing Title:

OVERALL FLOOR PLANS

BID DOCUMENT

Drawing No.:

TS110

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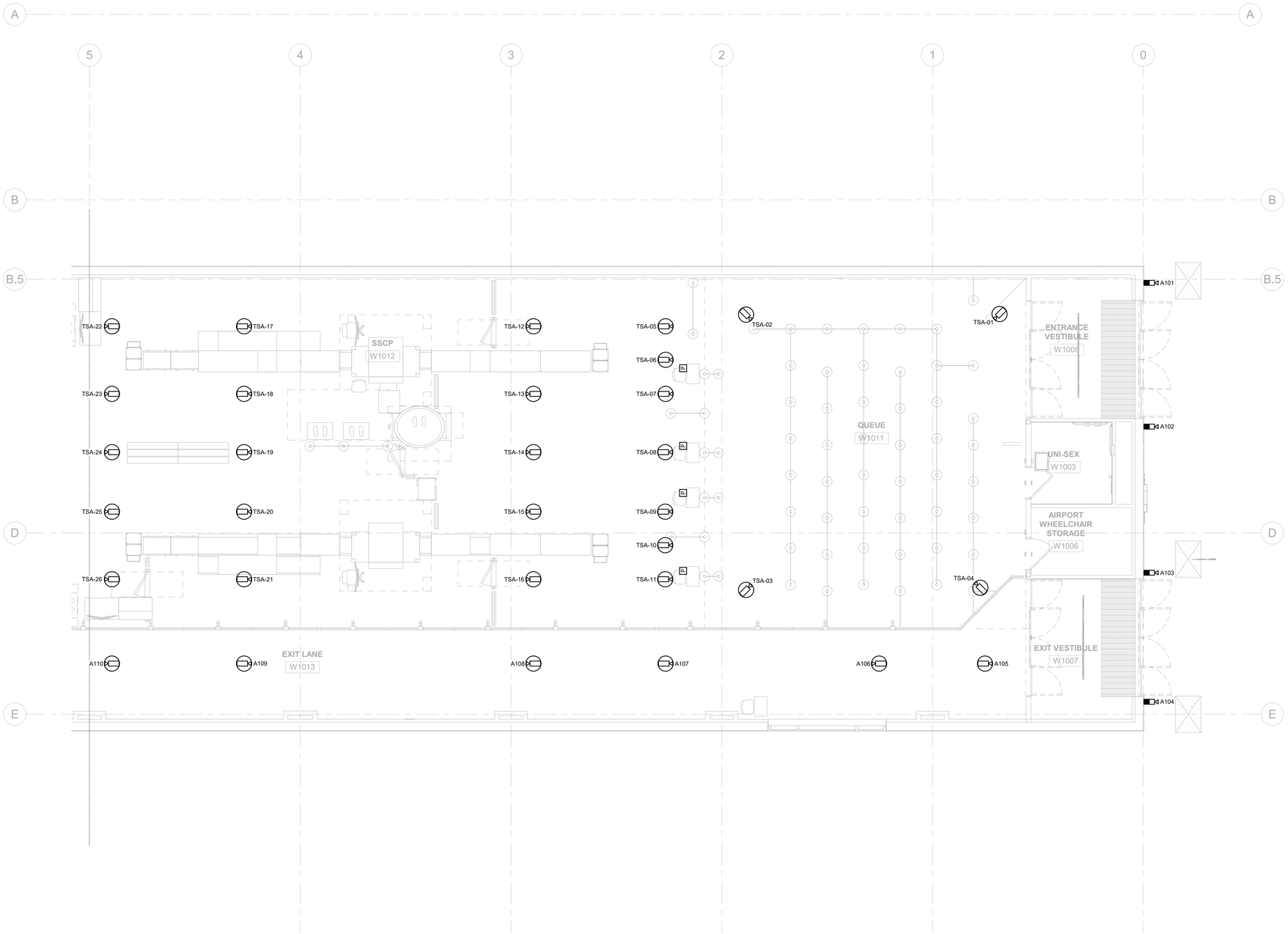

1 LEVEL 1 - SECURITY - AREA 1
3/16" = 1'-0"

SECURITY - ADD ALTERNATE NOTES:

1. SC CONTRACTOR SHALL PRICE WORK FOR ADD ALTERNATES IN AREAS AS CALLED OUT ON ARCHITECTURAL DRAWINGS AND AS DEFINED ON SHEET G211. INCLUDE MATERIALS AND LABOR COST FOR ADD ALTERNATES AS REQUIRED.
2. SC CONTRACTOR SHALL COORDINATE WITH ARCHITECT FOR DELINEATION AND DOCUMENTATION TO INCLUDE ADD ALTERNATES.

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ENLARGED FLOOR PLAN LEVEL 1 - AREA 1

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Drawing No.:

TS211

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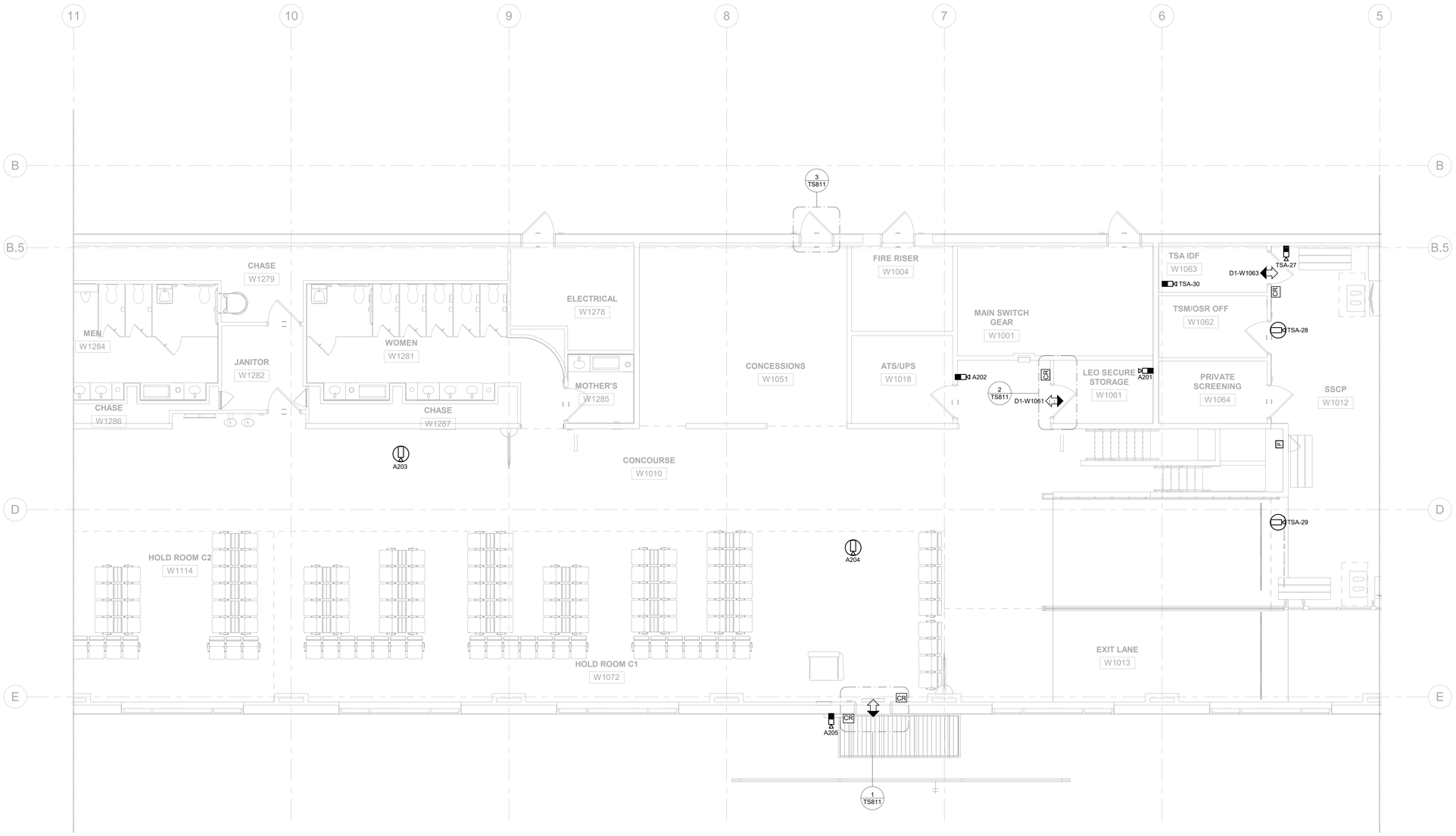

1 LEVEL 1 - SECURITY - AREA 2
3/16" = 1'-0"

SECURITY - ADD ALTERNATE NOTES:

1. SC CONTRACTOR SHALL PRICE WORK FOR ADD ALTERNATES IN AREAS AS CALLED OUT ON ARCHITECTURAL DRAWINGS AND AS DEFINED ON SHEET G211. INCLUDE MATERIALS AND LABOR COST FOR ADD ALTERNATES AS REQUIRED.
2. SC CONTRACTOR SHALL COORDINATE WITH ARCHITECT FOR DELINEATION AND DOCUMENTATION TO INCLUDE ADD ALTERNATES.

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MLM JOB # TYPE PROPERTY

JOHN E. BURNS
LICENSE
No 62139
STATE OF FLORIDA
PROFESSIONAL ENGINEER

SEAL

Revisions

No.	Date	Description

Project No.:	Project Number
Designed By:	AB
Drawn By:	AB
Checked By:	JB
Issue Date:	30-NOV-2020
Drawing Scale:	

Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 2

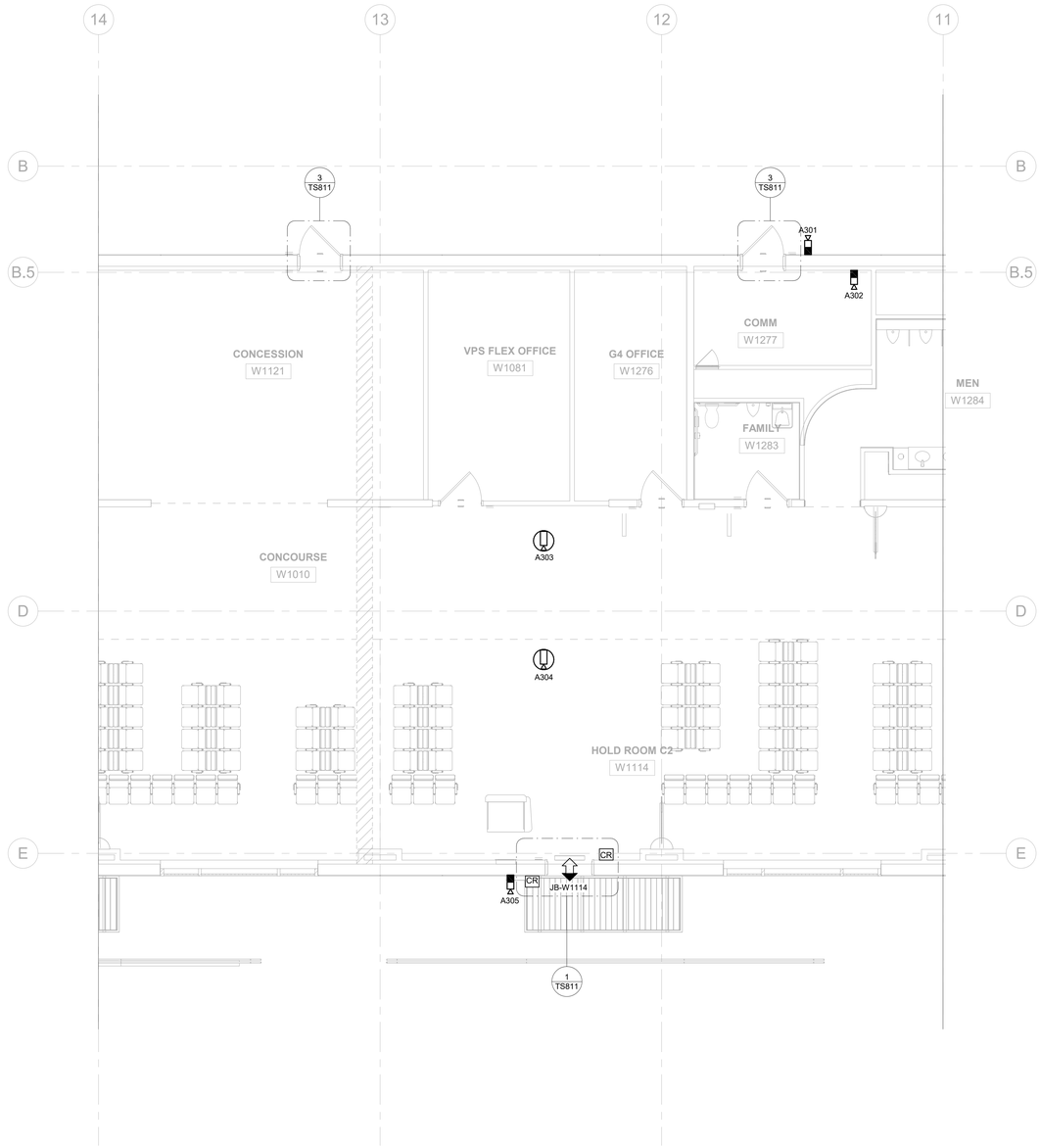
BID DOCUMENT

Drawing No.:

TS212

BIM 360://Design of Satellite Concourse/VPS_ETSTCFA.rvt

12/3/2020 1:55:37 PM



1 LEVEL 1 - SECURITY - AREA 3
3/16" = 1'-0"

SECURITY - ADD ALTERNATE NOTES:

1. SC CONTRACTOR SHALL PRICE WORK FOR ADD ALTERNATES IN AREAS AS CALLED OUT ON ARCHITECTURAL DRAWINGS AND AS DEFINED ON SHEET G211. INCLUDE MATERIALS AND LABOR COST FOR ADD ALTERNATES AS REQUIRED.
2. SC CONTRACTOR SHALL COORDINATE WITH ARCHITECT FOR DELINEATION AND DOCUMENTATION TO INCLUDE ADD ALTERNATES.

C19-2811-AP
Design of Satellite Concourse 'C'

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Drawing Scale:	

Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 3

BID DOCUMENT

Drawing No.:

TS213

BIM 360://Design of Satellite Concourse\VPS_ETSTCFA.rvt

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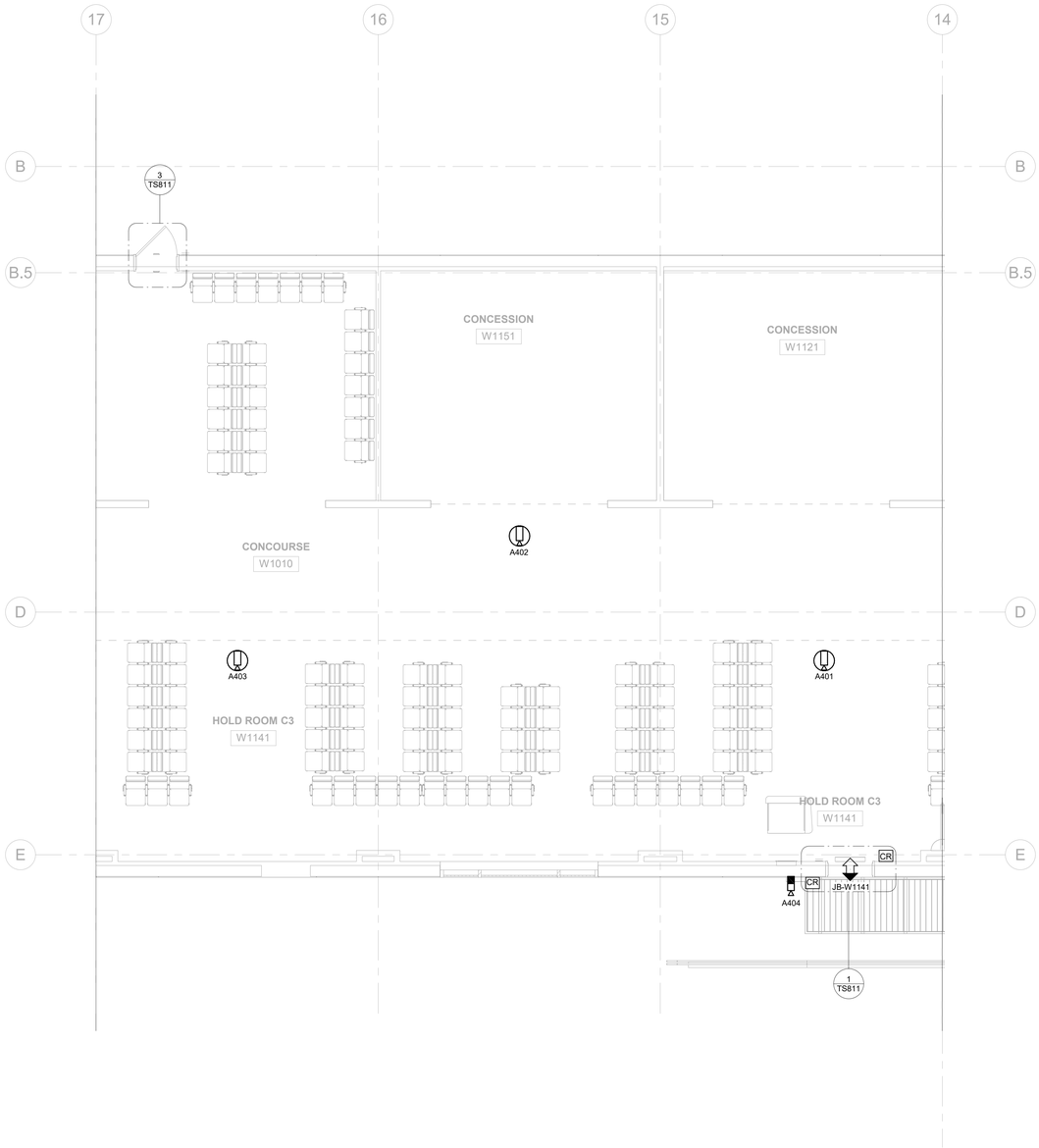

1 LEVEL 1 - SECURITY - AREA 4
3/16" = 1'-0"

SECURITY - ADD ALTERNATE NOTES:

1. SC CONTRACTOR SHALL PRICE WORK FOR ADD ALTERNATES IN AREAS AS CALLED OUT ON ARCHITECTURAL DRAWINGS AND AS DEFINED ON SHEET G211. INCLUDE MATERIALS AND LABOR COST FOR ADD ALTERNATES AS REQUIRED.
2. SC CONTRACTOR SHALL COORDINATE WITH ARCHITECT FOR DELINEATION AND DOCUMENTATION TO INCLUDE ADD ALTERNATES.

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Checked By:	**JB**
Issue Date:	**30-NOV-2020**
Drawing Scale:	

Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 4

BID DOCUMENT

Drawing No.:

TS214

BIM 360://Design of Satellite Concourse/VPS_ETSTCFA.rvt

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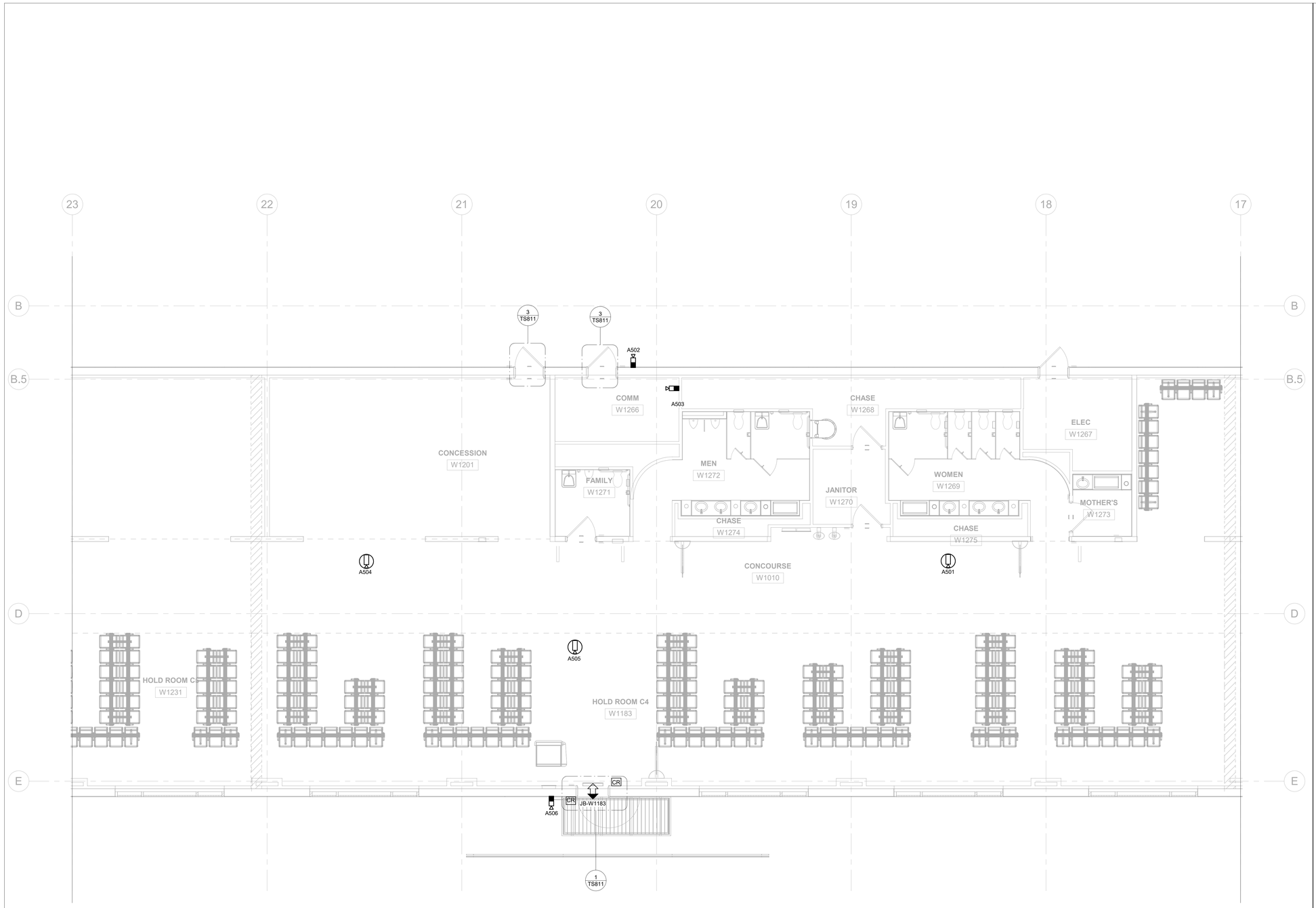

1 LEVEL 1 - SECURITY - AREA 5
3/16" = 1'-0"

SECURITY - ADD ALTERNATE NOTES:

1. SC CONTRACTOR SHALL PRICE WORK FOR ADD ALTERNATES IN AREAS AS CALLED OUT ON ARCHITECTURAL DRAWINGS AND AS DEFINED ON SHEET G211. INCLUDE MATERIALS AND LABOR COST FOR ADD ALTERNATES AS REQUIRED.
2. SC CONTRACTOR SHALL COORDINATE WITH ARCHITECT FOR DELINEATION AND DOCUMENTATION TO INCLUDE ADD ALTERNATES.

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Drawn By:	AB
Checked By:	JB
Issue Date:	30-NOV-2020
Drawing Scale:	

Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 5

BID DOCUMENT

Drawing No.:

TS215

BIM 360://Design of Satellite Concourse\VPS_ETSTCFA.rvt

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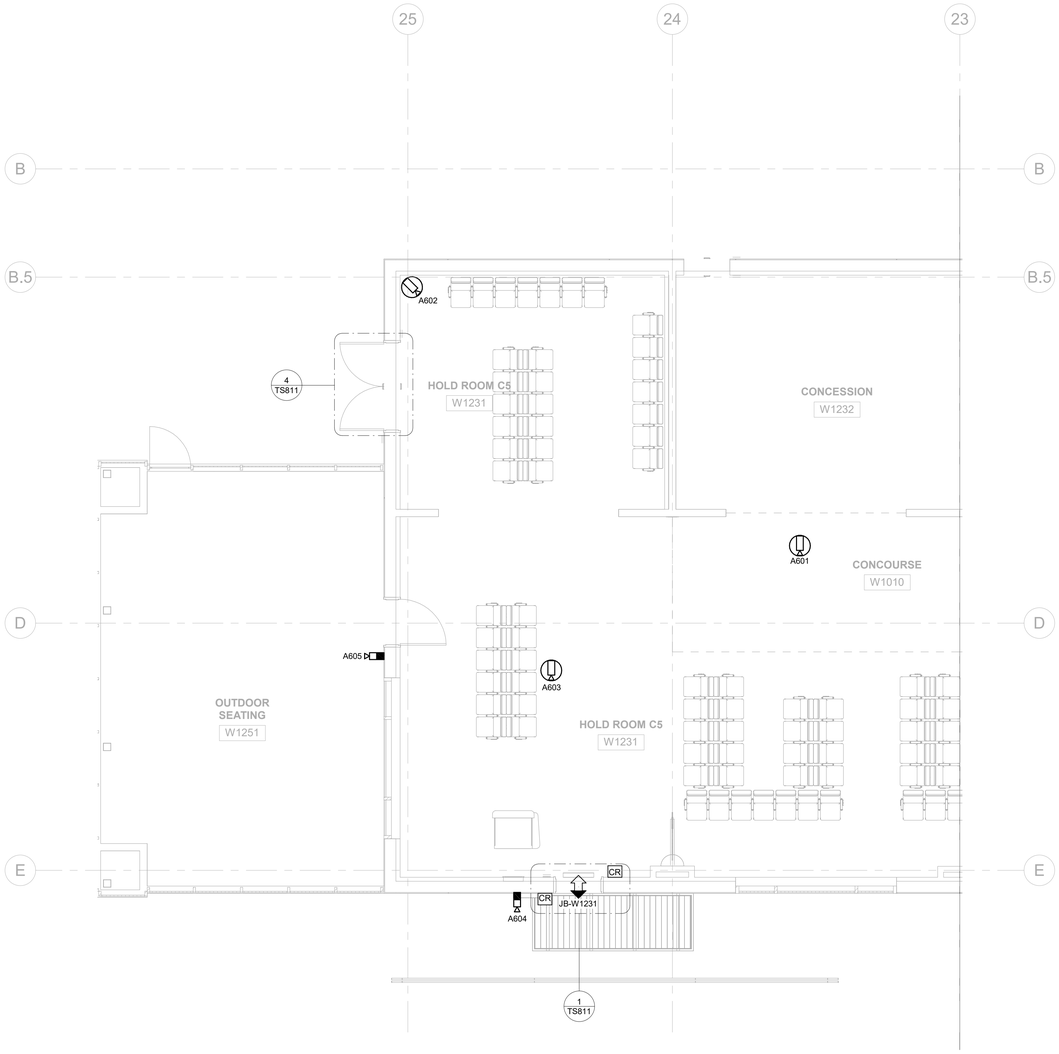

1 LEVEL 1 - SECURITY - AREA 6
3/16" = 1'-0"

SECURITY - ADD ALTERNATE NOTES:

1. SC CONTRACTOR SHALL PRICE WORK FOR ADD ALTERNATES IN AREAS AS CALLED OUT ON ARCHITECTURAL DRAWINGS AND AS DEFINED ON SHEET G211. INCLUDE MATERIALS AND LABOR COST FOR ADD ALTERNATES AS REQUIRED.
2. SC CONTRACTOR SHALL COORDINATE WITH ARCHITECT FOR DELINEATION AND DOCUMENTATION TO INCLUDE ADD ALTERNATES.

OKALOOSA COUNTY

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No.	Date	Description

Project No.:	**Project Number**
Designed By:	**AB**
Drawn By:	**AB**
Checked By:	**JB**
Issue Date:	**30-NOV-2020**
Drawing Scale:	

Drawing Title:

ENLARGED FLOOR PLAN LEVEL 1 - AREA 6

BID DOCUMENT

Drawing No.:

TS216

BIM 360://Design of Satellite Concourse\VPS_ETSTCFA.rvt

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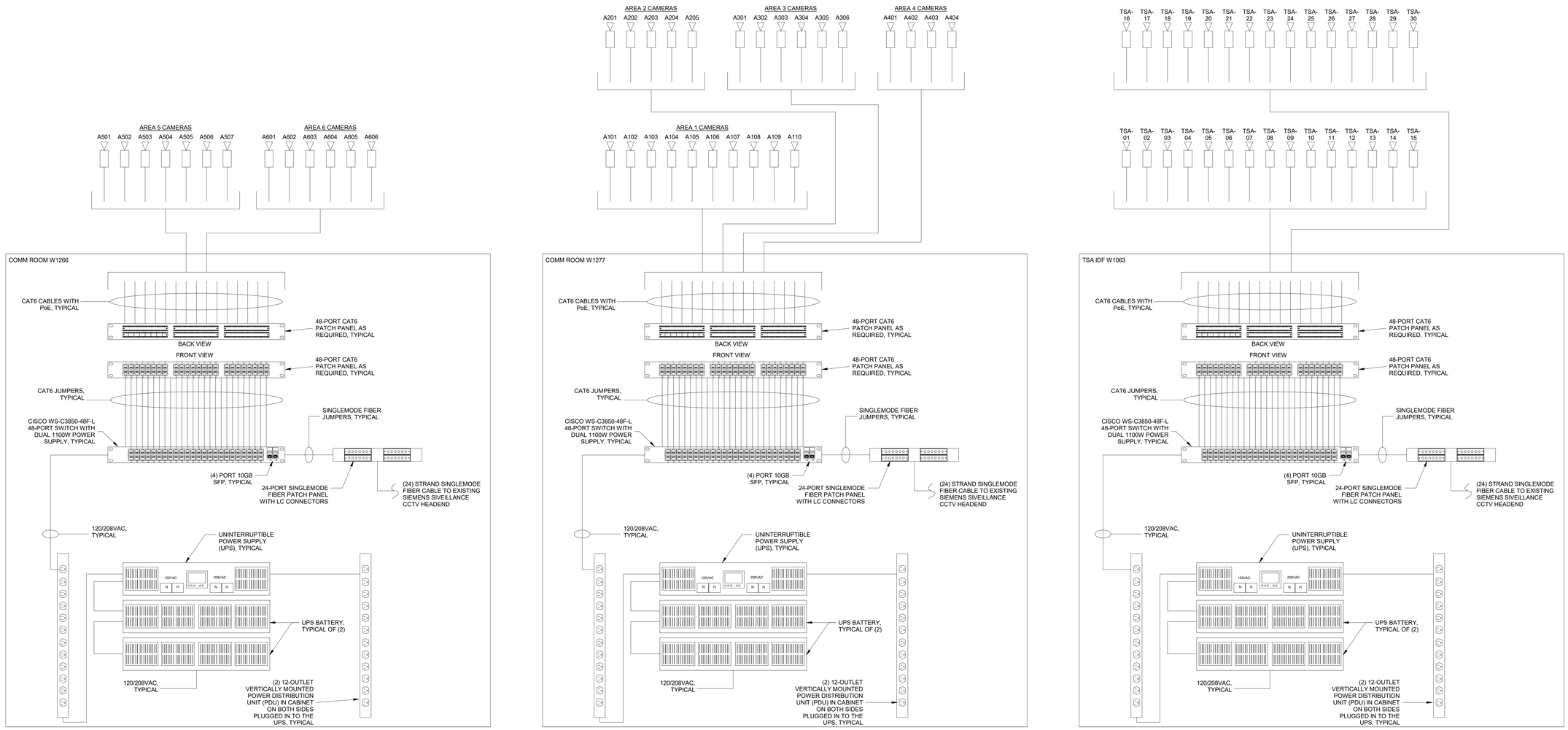
NOTES:

1. FOR GENERAL NOTES, LEGEND, ABBREVIATIONS AND SYMBOLS, SEE DRAWING TS001 AND TS002.
2. RISER DIAGRAM IS DIAGRAMMATIC ONLY AND HAS BEEN PROVIDED TO DEPICT THE GENERAL ARRANGEMENT AND INSTALLATION REQUIREMENTS OF THE VIDEO SURVEILLANCE SYSTEM. UNLESS OTHERWISE NOTED, ALL HEADEND VIDEO SURVEILLANCE SYSTEM (VERINT) EQUIPMENT IS EXISTING. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL NECESSARY CONDUITS, CABLING, CONNECTING HARDWARE, MOUNTING HARDWARE, BACKBOXES, PULL/JUNCTION BOXES, TRENCHING/DUCTBANKS, CAMERA POLES, CAMERA MOUNTING BRACKETS, COMPONENTS, DEVICES, COMMISSIONING UNLESS OTHERWISE NOTED, AS WELL AS ALL LICENSES, ELECTRICAL POWER, GROUNDING AND APPURTENANCES AS REQUIRED TO PROVIDE FULLY OPERATIONAL SYSTEM.
3. REFER TO FLOOR PLANS FOR EXACT LOCATION AND QUANTITY OF CCTV CAMERAS.
4. ALL EQUIPMENT ARE NEW UNLESS OTHERWISE NOTED.

SECURITY - ADD ALTERNATE NOTES:

1. SC CONTRACTOR SHALL PRICE WORK FOR ADD ALTERNATES IN AREAS AS CALLED OUT ON ARCHITECTURAL DRAWINGS AND AS DEFINED ON SHEET G211. INCLUDE MATERIALS AND LABOR COST FOR ADD ALTERNATES AS REQUIRED.
2. SC CONTRACTOR SHALL COORDINATE WITH ARCHITECT FOR DELINEATION AND DOCUMENTATION TO INCLUDE ADD ALTERNATES.



1 CCTV RISER DIAGRAM
NONE

OKALOOSA COUNTY

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No.	Date	Description

Project No.:	Project Number
Designed By:	AB
Drawn By:	AB
Checked By:	JB
Issue Date:	30-NOV-2020
Drawing Scale:	

Drawing Title:

SINGLE LINE DIAGRAM - CCTV

BID DOCUMENT

Drawing No.:

TS511

BIM 360://Design of Satellite Concourse/VPS_ETSTCFA.rvt

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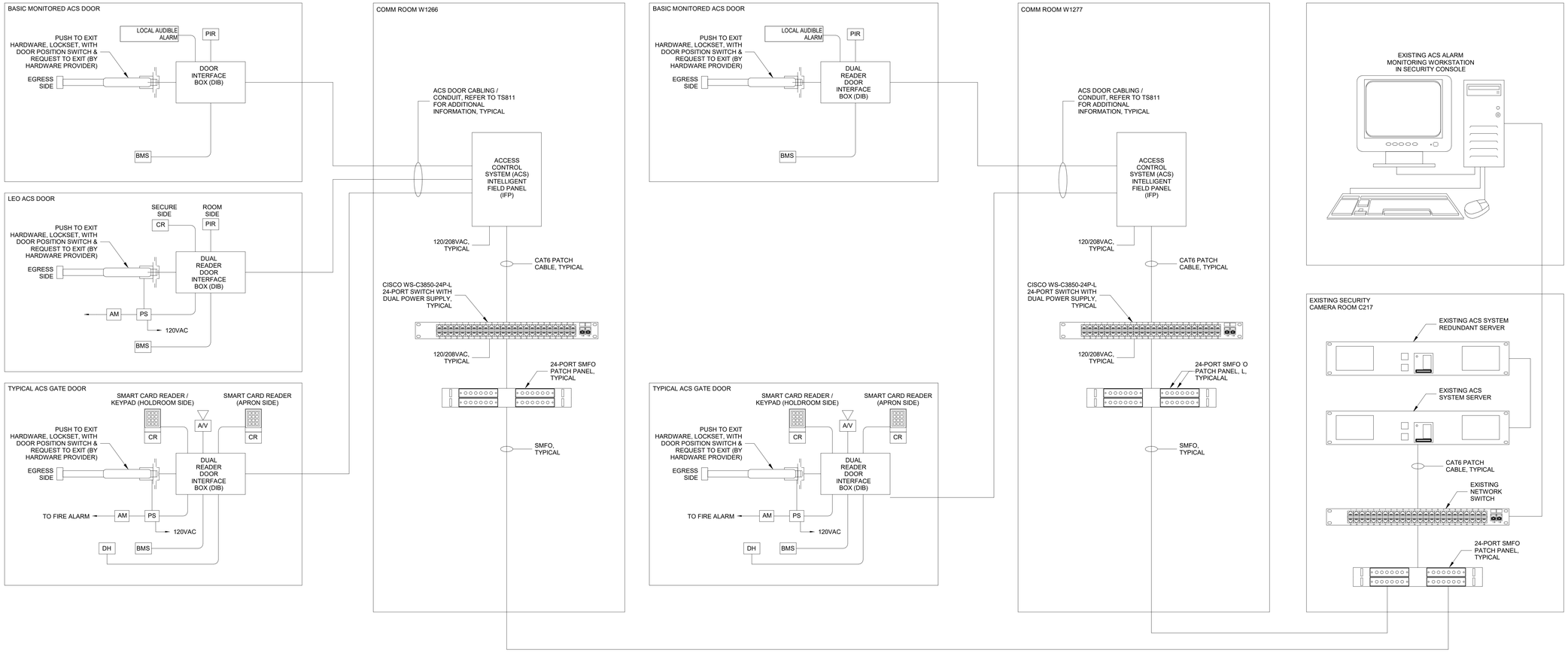
NOTES:

1. FOR GENERAL NOTES, LEGEND, ABBREVIATIONS AND SYMBOLS, SEE DRAWING ES000.
2. SEE DRAWING TS811 FOR TYPICAL ACCESS CONTROLLED DOOR INSTALLATION DETAILS. CONTRACTOR SHALL COORDINATE WITH DOOR HARDWARE PROVIDER.
3. RISER DIAGRAM IS DIAGRAMMATIC ONLY AND HAS BEEN PROVIDED TO DEPICT THE GENERAL ARRANGEMENT AND INSTALLATION REQUIREMENTS OF THE SECURITY ACCESS CONTROLLED SYSTEM (SACS). UNLESS OTHERWISE NOTED, ALL HEADEND SACS (GENETEC) EQUIPMENT IS EXISTING. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL NECESSARY CONDUITS, CABLING, CONNECTING HARDWARE, MOUNTING HARDWARE, BACKBOXES, PULL/JUNCTION BOXES, TRENCHING/DUCTBANKS, POLES, MOUNTING BRACKETS, COMPONENTS, DEVICES, COMMISSIONING UNLESS OTHERWISE NOTED, AS WELL AS ALL LICENSES, ELECTRICAL POWER, GROUNDING AND APPURTENANCES AS REQUIRED TO PROVIDE FULLY OPERATIONAL SYSTEM.
4. REFER TO FLOOR PLANS FOR EXACT LOCATION AND QUANTITY OF ACCESS CONTROLLED DOORS/GATES.

SECURITY - ADD ALTERNATE NOTES:

1. SC CONTRACTOR SHALL PRICE WORK FOR ADD ALTERNATES IN AREAS AS CALLED OUT ON ARCHITECTURAL DRAWINGS AND AS DEFINED ON SHEET G211. INCLUDE MATERIALS AND LABOR COST FOR ADD ALTERNATES AS REQUIRED.
2. SC CONTRACTOR SHALL COORDINATE WITH ARCHITECT FOR DELINEATION AND DOCUMENTATION TO INCLUDE ADD ALTERNATES.



1 ACCESS CONTROL SYSTEM (ACS) RISER DIAGRAM
NONE

OKALOOSA COUNTY

FLY VPS

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Revisions

No.	Date	Description

Project No.:	Project Number
Designed By:	AB
Drawn By:	AB
Checked By:	JB
Issue Date:	30-NOV-2020
Drawing Scale:	

Drawing Title:
SINGLE LINE DIAGRAM - ACCESS CONTROL
BID DOCUMENT

Drawing No.:
TS512

BIM 360://Design of Satellite Concourse/VPS_ETSTCFA.rvt
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TSA CCTV CAMERA SCHEDULE

ID	TYPE	LOCATION	TARGET	MANUFACTURER	MODEL	LENS VARIFOCAL (mm)	RESOLUTION	POWER SUPPLY	POWER (W) PoE	SOURCE COMM. RM.	MOUNT STYLE	CABLE TYPE	CONDUIT	DWG. LOCATION / MOUNTING DETAIL	COMMENT
TSA-01	FIXED DOME	QUEUE W1011	TSA QUEING	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-02	FIXED DOME	QUEUE W1011	TSA QUEING	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-03	FIXED DOME	QUEUE W1011	TSA QUEING	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-04	FIXED DOME	QUEUE W1011	TSA QUEING	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-05	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-06	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-07	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-08	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-09	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-10	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-11	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-12	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-13	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-14	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-15	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-16	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-17	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-18	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-19	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-20	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-21	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-22	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-23	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-24	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-25	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-26	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-27	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	WALL FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1B-TS-812	
TSA-28	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-29	FIXED DOME	SSCP W1012	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
TSA-30	FIXED DOME	TSA IDF W1063	TSA CHECKPOINT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1063	WALL FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1B-TS-812	

FACILITY CCTV CAMERA SCHEDULE

ID	TYPE	LOCATION	TARGET	MANUFACTURER	MODEL	LENS VARIFOCAL (mm)	RESOLUTION	POWER SUPPLY	POWER (W) PoE	SOURCE COMM. RM.	MOUNT STYLE	CABLE TYPE	CONDUIT	DWG. LOCATION / MOUNTING DETAIL	COMMENT
A101	FIXED DOME	FRONT ENTRANCE/EXIT	FRONT ENTRANCE/EXIT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1277	WALL SURFACE	CAT6 (DATA & POWER)	EMT	TS211 / 1B-TS-812	
A102	FIXED DOME	FRONT ENTRANCE/EXIT	FRONT ENTRANCE/EXIT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1277	WALL SURFACE	CAT6 (DATA & POWER)	EMT	TS211 / 1B-TS-812	
A103	FIXED DOME	FRONT ENTRANCE/EXIT	FRONT ENTRANCE/EXIT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1277	WALL SURFACE	CAT6 (DATA & POWER)	EMT	TS211 / 1B-TS-812	
A104	FIXED DOME	FRONT ENTRANCE/EXIT	FRONT ENTRANCE/EXIT	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1277	WALL SURFACE	CAT6 (DATA & POWER)	EMT	TS211 / 1B-TS-812	
A105	FIXED DOME	EXIT LANE W1013	EXIT LANE W1013	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1277	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
A106	FIXED DOME	EXIT LANE W1013	EXIT LANE W1013	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1277	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
A107	FIXED DOME	EXIT LANE W1013	EXIT LANE W1013	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1277	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
A108	FIXED DOME	EXIT LANE W1013	EXIT LANE W1013	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1277	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
A109	FIXED DOME	EXIT LANE W1013	EXIT LANE W1013	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1277	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
A110	FIXED DOME	EXIT LANE W1013	EXIT LANE W1013	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1277	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS211 / 1A-TS-812	
A201	FIXED DOME	LEO SECURE STORAGE W1061	INTERIOR OF ROOM	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1277	WALL SURFACE	CAT6 (DATA & POWER)	EMT	TS212 / 1B-TS-812	
A202	FIXED DOME	OUTSIDE OF MAIN SWITCH GEAR W1001	MAIN SWITCH GEAR DOOR	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1277	WALL SURFACE	CAT6 (DATA & POWER)	EMT	TS212 / 1B-TS-812	
A203	360° FIXED DOME	HOLD ROOM C1 W1072	HOLD ROOM C1 & CORRIDOR	AXIS	M3058-PLVE	1.3mm	12MP	PoE	TYP. 7.8; MAX. 12.95	COMM. ROOM W1277	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS212 / 1A-TS-812	
A204	FIXED DOME	HOLD ROOM C1 W1072	BOARDING PODIUM & GATE	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1277	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS212 / 1A-TS-812	
A205	FIXED DOME	EXTERIOR OF HOLD ROOM C1 W1072 GATE	EXTERIOR GATE DOOR	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1277	EXTERIOR WALL ARM	CAT6 (DATA & POWER)	EMT	TS212 / 1D-TS-812	
A301	FIXED DOME	EXTERIOR OF COMM W1277	COMM ROOM 1277 DOOR	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1277	EXTERIOR WALL ARM	CAT6 (DATA & POWER)	EMT	TS213 / 1D-TS-812	
A302	FIXED DOME	INTERIOR OF COMM W1277	INTERIOR OF COMM W1277	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1277	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS213 / 1A-TS-812	
A303	360° FIXED DOME	HOLD ROOM C2 W1114	HOLD ROOM C2 & CORRIDOR	AXIS	M3058-PLVE	1.3mm	12MP	PoE	TYP. 7.8; MAX. 12.95	COMM. ROOM W1277	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS213 / 1A-TS-812	
A304	FIXED DOME	HOLD ROOM C2 W1114	BOARDING PODIUM & GATE	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1277	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS213 / 1A-TS-812	
A305	FIXED DOME	EXTERIOR OF HOLD ROOM C2 W1114 GATE	EXTERIOR GATE DOOR	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1277	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS213 / 1D-TS-812	
A401	FIXED DOME	HOLD ROOM C3 W1141	BOARDING PODIUM & GATE	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1277	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS214 / 1A-TS-812	
A402	360° FIXED DOME	HOLD ROOM C3 W1141	HOLD ROOM C3 & CORRIDOR	AXIS	M3058-PLVE	1.3mm	12MP	PoE	TYP. 7.8; MAX. 12.95	COMM. ROOM W1277	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS214 / 1A-TS-812	
A403	FIXED DOME	HOLD ROOM C3 W1141	BOARDING PODIUM & GATE	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1277	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS214 / 1A-TS-812	
A404	FIXED DOME	EXTERIOR OF HOLD ROOM C3 W1141 GATE	EXTERIOR GATE DOOR	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1277	EXTERIOR WALL ARM	CAT6 (DATA & POWER)	EMT	TS214 / 1D-TS-812	
A501	360° FIXED DOME	HOLD ROOM C4 W1183	HOLD ROOM C4 & CORRIDOR	AXIS	M3058-PLVE	1.3mm	12MP	PoE	TYP. 7.8; MAX. 12.95	COMM. ROOM W1266	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS215 / 1A-TS-812	
A502	FIXED DOME	EXTERIOR OF COMM W1266	COMM ROOM 1266 DOOR	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1266	EXTERIOR WALL ARM	CAT6 (DATA & POWER)	EMT	TS215 / 1D-TS-812	
A503	FIXED DOME	INTERIOR OF COMM W1266	INTERIOR OF COMM W1266	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1266	WALL SURFACE	CAT6 (DATA & POWER)	EMT	TS215 / 1B-TS-812	
A504	360° FIXED DOME	HOLD ROOM C4 W1183	HOLD ROOM C4 & CORRIDOR	AXIS	M3058-PLVE	1.3mm	12MP	PoE	TYP. 7.8; MAX. 12.95	COMM. ROOM W1266	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS215 / 1A-TS-812	
A505	FIXED DOME	HOLD ROOM C4 W1183	BOARDING PODIUM & GATE	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1266	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS215 / 1A-TS-812	
A506	FIXED DOME	EXTERIOR OF HOLD ROOM C3 W1141 GATE	EXTERIOR GATE DOOR	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1266	EXTERIOR WALL ARM	CAT6 (DATA & POWER)	EMT	TS215 / 1D-TS-812	
A601	360° FIXED DOME	HOLD ROOM C4 W1183	HOLD ROOM C4 & CORRIDOR	AXIS	M3058-PLVE	1.3mm	12MP	PoE	TYP. 7.8; MAX. 12.95	COMM. ROOM W1266	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS216 / 1A-TS-812	
A602	FIXED DOME	HOLD ROOM C5 W1231	BOARDING PODIUM & GATE	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1266	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS216 / 1A-TS-812	
A603	FIXED DOME	HOLD ROOM C5 W1231	LOUNGE AREA	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1266	CEILING FLUSH	CAT6 (DATA & POWER)	EMT	TS216 / 1A-TS-812	
A604	FIXED DOME	EXTERIOR OF HOLD ROOM C5 W1231 GATE	EXTERIOR GATE DOOR	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1266	EXTERIOR WALL ARM	CAT6 (DATA & POWER)	EMT	TS216 / 1D-TS-812	
A605	FIXED DOME	OUTDOOR SEATING W1251	OUTDOOR SEATING	AXIS	Q3515-LVE	3mm - 9mm	1080P	PoE	TYP. 5.6; MAX. 12.5	COMM. ROOM W1266	EXTERIOR WALL ARM	CAT6 (DATA & POWER)	EMT	TS216 / 1D-TS-812	

SECURITY CAMERA NOTES:

1. FINAL LOCATION OF ALL SECURITY CAMERAS SHALL BE REVIEWED AND APPROVED BY THE AUTHORITY.
2. THE CONTRACTOR SHALL PERFORM A FIELD SURVEY TO DETERMINE THE OPTIMAL METHOD OF MOUNTING ALL SECURITY CAMERAS.
3. MOUNT SECURITY CAMERAS A MINIMUM OF 8 FEET AFF/AFG OR AS INDICATED ON THE CAMERA SCHEDULE. EXCEPT WHERE EXISTING ARCHITECTURAL FEATURES AND CEILING DRIVE LOWER MOUNTING HEIGHTS.

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Revisions

No.	Date	Description

Project No.:	Project Number
Designed By:	AB
Drawn By:	AB
Checked By:	JB
Issue Date:	30-NOV-2020
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Drawing Title:

SCHEDULES - CCTV CAMERA

BID DOCUMENT

Drawing No.:

TS711

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DOOR SECURITY ACCESS CONTROL SYSTEM (SACS) SCHEDULE

ID	ARCH. DOOR #	ROOM NAME / LOCATION	SACS DOOR DETAIL	CARD READER ENTRY	CARD READER EXIT	DRAWING	SOURCE COMM. RM.	COMMENT
W1051	W1051	CONCESSONS	3 / TS811	YES	NO	TS212	COMM. ROOM W1277	
D1-W1061	W1061	LEO SECURE STORAGE W1061	2 / TS811	YES	NO	TS212	COMM. ROOM W1277	
W1277	W1277	COMM ROOM W1277	3 / TS811	NO	NO	TS213	COMM. ROOM W1277	
W1121	W1121	CONCESSIONS	3 / TS811	NO	NO	TS213	COMM. ROOM W1277	
W1114	W1114	APRON DOOR	1 / TS811	YES	YES	TS213	COMM. ROOM W1277	
W1141	W1141	APRON DOOR	1 / TS811	YES	YES	TS214	COMM. ROOM W1277	
W1151	W1151	CONCESSIONS	3 / TS811	NO	NO	TS214	COMM. ROOM W1266	
W1183	W1183	APRON DOOR	1 / TS811	YES	YES	TS215	COMM. ROOM W1266	
W1201	W1201	CONCESSIONS	3 / TS811	YES	YES	TS215	COMM. ROOM W1266	
W1266	W1266	COMM ROOM W1266	3 / TS811	NO	NO	TS215	COMM. ROOM W1266	
W1231	W1231	APRON DOOR	1 / TS811	YES	YES	TS216	COMM. ROOM W1266	
W1231	W1231	HOLD ROOM	4 / TS811	NO	NO	TS216	COMM. ROOM W1266	

SACS NOTES:

1. COORDINATE CONNECTION OF ALL ACCESS CONTROLLED DEVICES WITH DOOR HARDWARE PROVIDER.
2. REFER TO ARCHITECTURAL PLANS FOR DOOR NUMBERING.

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Drawing Title:

SCHEDULES - DOOR ACCESS CONTROL

BID DOCUMENT

Drawing No.:

TS712

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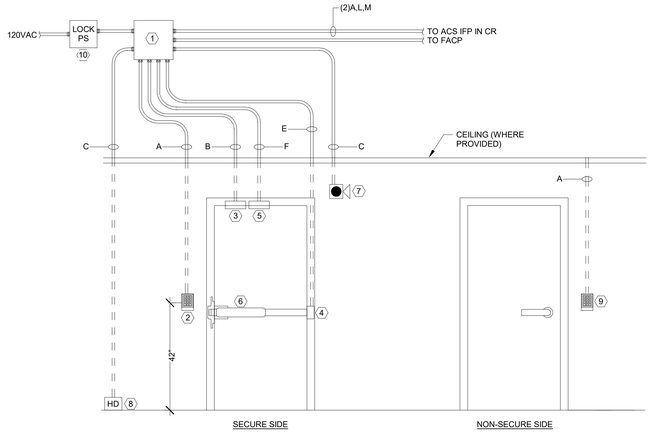
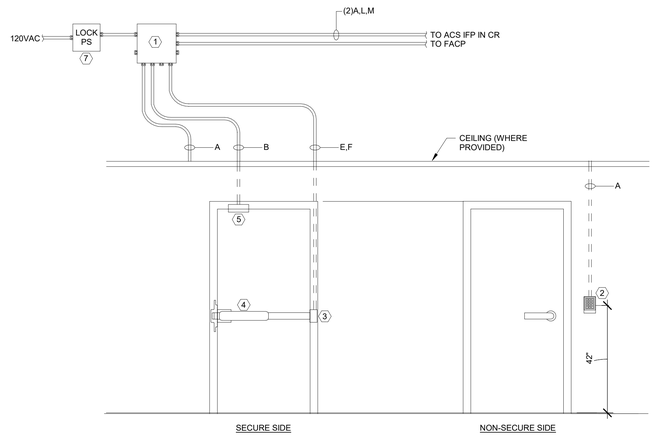


ACS EQUIPMENT AT DOOR:

1. DOOR INTERFACE BOX WITH TERMINAL STRIPS
2. SMART CARD READER / KEYPAD (INSIDE HOLDROOM)
3. BALANCED MAGNETIC SWITCH
4. POWER TRANSFER HINGE (DIV. 8)
5. ELECTROMAGNETIC LOCK WITH POWER SUPPLY (DIV. 8)
6. PANIC HARDWARE WITH REX SWITCH (DIV. 8)
7. AUDIBLE/VISUAL DEVICE
8. MAGNETIC DOOR HOLDER AND POWER SUPPLY (DIV. 8)
9. SMART CARD READER (INSIDE GATE DOOR)
10. ACS DOOR CONTROL MODULE AND POWER SUPPLY AT IFP

1 GATE DOOR ACS DOOR DETAIL
NTS



ACS EQUIPMENT AT DOOR:

1. DOOR INTERFACE BOX WITH TERMINAL STRIPS
2. SMART CARD READER (NON-EGRESS SIDE)
3. POWER TRANSFER HINGE (DIV. 8)
4. PANIC DELAY / LOCKING HARDWARE (DIV. 8) WITH POWER SUPPLY
5. BALANCED MAGNETIC SWITCH
6. FIRE ALARM INTERFACE AT IFP
7. ACS DOOR CONTROL MODULE WITH POWER SUPPLY AT IFP

2 LEO ACS DOOR DETAIL
NTS

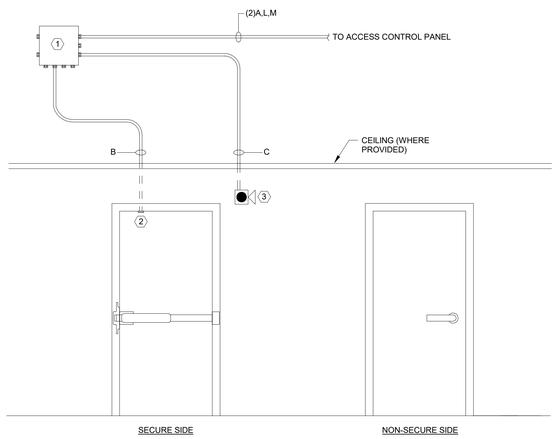
GENERAL ACS DETAIL NOTES:

1. THE DOOR DETAILS ARE DIAGRAMMATIC IN NATURE ONLY TO SHOW EQUIPMENT AND GENERAL WIRING INFORMATION. MOUNTING CONDITIONS, MATERIAL TYPES, DOOR SWINGS, ETC. ARE NOT SHOWN.
2. CONTRACTOR SHALL BE FAMILIAR WITH EACH DOOR AND ADAPT THE EQUIPMENT TO THE FIELD CONDITIONS.
3. SEE ELECTRICAL DRAWINGS FOR 120V POWER LOCATIONS.
4. ACS CABLING SHALL BE ROUTED IN CONDUIT. MINIMUM SIZE CONDUIT SHALL BE 3/4"C FROM ACS DEVICE TO THE DIB. MINIMUM SIZE CONDUIT FROM THE DIB TO THE IFP IN THE COMMUNICATIONS ROOM SHALL BE 1 1/2"C. CONDUIT SHALL BE CONCEALED. PROVIDE PULL BOXES AS REQUIRED BY THE NEC. FIELD ROUTE CONDUIT FROM THE ACS DEVICES TO THE DIB AND IFP. IF THE ACS SYSTEM PROPOSED BY THE CONTRACTOR USES LARGER CABLES THAN INDICATED IN THE CABLE SCHEDULE, THE CONTRACTOR SHALL INCREASE THE CONDUIT SIZE ACCORDINGLY TO MAINTAIN THE SPARE CONDUIT CAPACITY.

ACS CABLE SCHEDULE

TYPE	DESCRIPTION	CABLE TYPE	O.D. MM (IN)	BELDEN #
A	CARD READER CABLE	9 CONDUCTOR 18 AWG SHIELDED	6.91 (0.272)	5307FE
B	BALANCE MAGNETIC SWITCH	2 CONDUCTOR 22 AWG UNSHIELDED	3.25 (0.128)	5500UE
C	AUDIBLE/VISUAL CABLE	2 CONDUCTOR 16 AWG UNSHIELDED	4.67 (0.184)	5200UE
D	ACS DATA CABLE (RS485)	2 PAIR 22 AWG SHIELDED, EACH PAIR SHLD	4.78 (0.188)	5302UE
E	REQUEST TO EXIT / PANIC HARDWARE	2 CONDUCTOR 22 AWG UNSHIELDED	3.25 (0.128)	5500UE
F	MAG LOCK OR POWER CABLE	4 CONDUCTOR 16 AWG UNSHIELDED	5.49 (0.26)	5202UE
G	EMERGENCY MAG LOCK DATA CABLE, ELECTRIC DELAY HARDWARE OR MISC DATA	2 CONDUCTOR 22 AWG UNSHIELDED	3.25 (0.128)	5500UE
H	DIB TAMPER CABLE	2 CONDUCTOR 22 AWG UNSHIELDED	3.25 (0.128)	5500UE
J	DATA CABLE - ETHERNET	4 PAIR #23 AWG CAT6	5.77 (0.227)	
K	DATA CABLE - FIBER	6 STRAND 62.5/125 MICRON INDOOR/OUTDOOR LOOSE TUBE MULTI-MODE FIBER OPTIC CABLE	9.65 (0.38)	M9B810
L	INPUT BACKBONE CABLE	12 CONDUCTOR 22 AWG UNSHIELDED	5.92 (0.233)	5509UE
M	OUTPUT BACKBONE CABLE	7 CONDUCTOR 16 AWG UNSHIELDED	6.63 (0.261)	5205UE

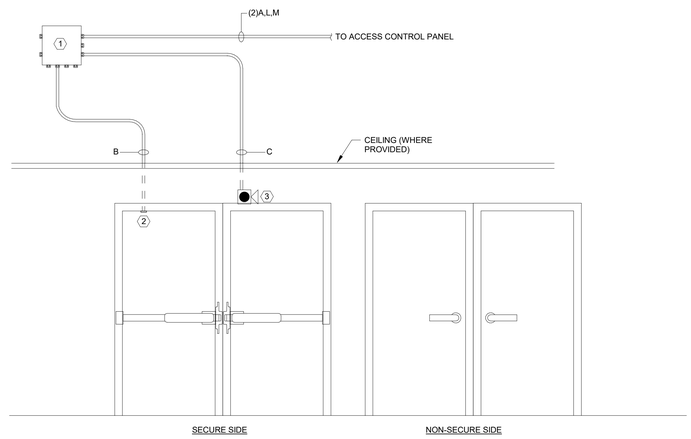
NOTE: CONTRACTOR SHALL VERIFY THE MANUFACTURER'S RECOMMDED CABLES FOR HIS SYSTEM AND USE THE APPROPRIATE CABLE TYPES. THE CABLES LISTED ARE BASED UPON BELDEN. EQUAL BY WEST PENN IS ACCEPTABLE. ANY INCREASE IN CONDUIT SIZE DUE TO THE SYSTEM CHOSEN SHALL BE THE CONTRACTOR'S RESPONSIBILITY. CABLE TYPES ARE PROVIDED FOR REFERENCE PURPOSES ONLY.



ACS EQUIPMENT AT DOOR:

1. DOOR INTERFACE BOX WITH TERMINAL STRIPS
2. DOOR CONTACT
3. LOCAL AUDIBLE ALARM

3 BASIC DOOR ACS DOOR DETAIL
NTS



ACS EQUIPMENT AT DOOR:

1. DOOR INTERFACE BOX WITH TERMINAL STRIPS
2. DOOR CONTACT
3. LOCAL AUDIBLE ALARM

4 BASIC DOUBLE DOOR ACS DOOR DETAIL
NTS

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Revisions

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Drawing Title:

DETAILS - SECURITY DOORS

BID DOCUMENT

Drawing No.:

TS811

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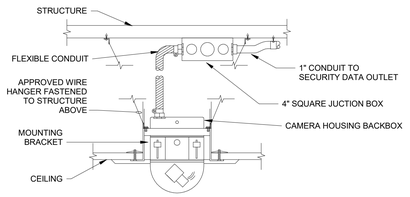
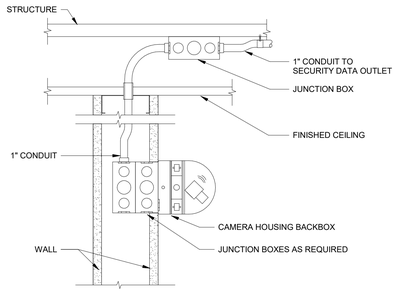
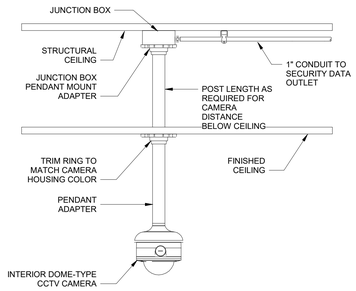


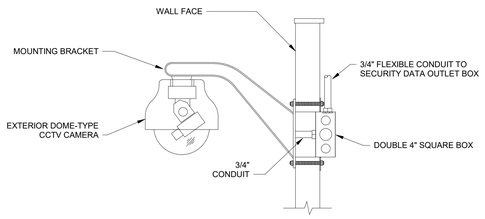
VSS CAMERA TYPE 1A -
INTERIOR/EXTERIOR FIXED/PTZ/180/360
1 DOME CEILING MOUNT
NTS



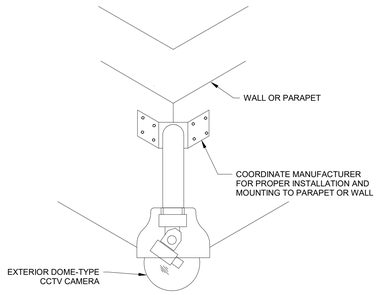
VSS CAMERA TYPE 1B -
INTERIOR/EXTERIOR FIXED/PTZ/180
2 WALL FLUSH MOUNT
NTS



VSS CAMERA TYPE 1C -
FIXED/PTZ/180/360 CEILING PENDANT
3 MOUNT
NTS



VSS CAMERA TYPE 1D -
INTERIOR/EXTERIOR FIXED/PTZ/180/360
4 DOME ARM/PENDANT MOUNT
NTS



VSS CAMERA TYPE 1E -
INTERIOR/EXTERIOR FIXED/PTZ/180/360
5 CORNER MOUNT
NTS

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Drawing Title:

DETAILS -
SECURITY CCTV

BID DOCUMENT

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